PROGRESSIVE MEDICINE.

A QUARTERLY DIGEST OF ADVANCES, DISCOVERIES, AND IMPROVEMENTS

IN THE

MEDICAL AND SURGICAL SCIENCES.

EDITED BY

HOBART AMORY HARE, M.D.,

PROFESSOR OF THERAPEUTICS AND MATERIA MEDICA IN THE JEFFERSON MEDICAL COLLEGE OF PHILA
DELPHIA; PHYSICIAN TO THE JEFFERSON MEDICAL COLLEGE HOSPITAL; ONE TIME CLINICAL
PROFESSOR OF DISEASES OF CHILDREN IN THE UNIVERSITY OF PENNSYLVANIA;
MEMBER OF THE ASSOCIATION OF AMERICAN PHYSICIANS, ETC.

ASSISTED BY

H. R. M. LANDIS, M.D.,

VISITING PHYSICIAN TO THE TUBERCULOSIS DEPARTMENT OF THE PHILADELPHIA HOSPITAL,
TO THE WHITE HAVEN SANATORIUM AND TO THE PHIPPS INSTITUTE; DEMONSTRATOR
OF CLINICAL MEDICINE IN THE JEFFERSON MEDICAL COLLEGE.

VOLUME II. JUNE, 1908.

HERNIA—SURGERY OF THE ABDOMEN, EXCLUSIVE OF HERNIA—GYNECOLOGY
—DISEASES OF THE BLOOD. DIATHETIC AND METABOLIC DISEASES.
DISEASES OF THE SPLEEN, THYROID GLAND, AND
LYMPHATIC SYSTEM—OPHTHALMOLOGY.

LEA & FEBIGER
PHILADELPHIA AND NEW YORK
1908
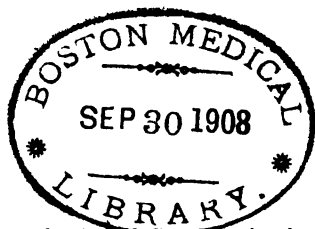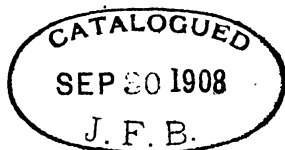
LIST OF CONTRIBUTORS.

WILLIAM T. BELFIELD, M.D.,
  Associate Professor of Surgery in the Rush Medical College; Professor of Genito-
    urinary and Venereal Diseases in the Chicago Polyclinic, Chicago.

JOSEPH C. BLOODGOOD, M.D.,
  Associate in Surgery, Johns Hopkins University, Baltimore, Md.

JOHN ROSE BRADFORD, M.D., F.R.C.P., F.R.S.,
  Professor of Medicine and Physician to the University College Hospital, London.

JOHN G. CLARK, M.D,
  Professor of Gynecology in the University of Pennsylvania, Philadelphia.

WILLIAM B. COLEY, M.D.,
  Attending Surgeon to the General Memorial Hospital; Associate Surgeon to
    the Hospital for Ruptured and Crippled; Clinical Lecturer in Surgery and
    Instructor in Surgery at the College of Physicians and Surgeons, Columbia
    University, New York.

FLOYD M. CRANDALL, M.D.,
  Adjunct Professor of Pediatrics, New York Polyclinic Hospital; Visiting
    Physician to the Minturn Hospital for Scarlet Fever and Diphtheria; Con-
    sulting Physician to the Infants' and Children's Hospitals, New York.

EDWARD P DAVIS, M.D.,
  Professor of Obstetrics in the Jefferson Medical College of Philadelphia.

ARTHUR B. DUEL, M.D.,
  Surgeon to the Manhattan Eye, Ear, and Throat Hospital; Consulting Aural
    Surgeon to the New York Health Board Hospitals; Otologist to the Babies
    Hospital.

WILLIAM EWART, M.D., F.R.C.P.,
  Physician to and Joint Lecturer on Medicine at St. George's Hospital, and
    Physician to the Belgrave Hospital for Children, London.

EDWARD MILTON FOOTE, M.D.,
  Instructor in Surgery, Columbia University; Visiting Surgeon, New York City
    Hospital and to St. Joseph's Hospital, New York City; Lecturer on Surgery
    New York Polyclinic.

CHARLES H. FRAZIER, M.D.,

Professor of Clinical Surgery in the University of Pennsylvania; Surgeon to the University, Howard, and Philadelphia Hospitals.

WILLIAM S. GOTTHEIL, M.D.,

Professor of Dermatology and Syphilology, New York School of Clinical Medicine; Consulting Dermatologist to the Sheltering Guardian Orphan Asylum; Dermatologist to the Lebanon and Beth Israel Hospital, and to the German West Side Dispensary, New York

EDWARD JACKSON, M.D.,

Professor of Ophthalmology in the University of Colorado; Ophthalmologist to the City and County Hospital of Denver.

D. BRADEN KYLE, M.D.,

Professor of Laryngology in the Jefferson Medical College, Philadelphia.

H. R. M. LANDIS, M.D.,

Visiting Physician to the Tuberculosis Department of the Philadelphia Hospital, to the White Haven Sanatorium and to the Phipps Institute; Demonstrator of Clinical Medicine in the Jefferson Medical College.

ROBERT B. PREBLE, A.B., M.D.,

Professor of Medicine in Northwestern University Medical School; Attending Physician to Cook County, St. Luke's, Wesley, German, and Polyclinic Hospitals, etc., Chicago.

WILLIAM G. SPILLER, M.D.,

Professor of Neuropathology and Associate Professor of Neurology in the University of Pennsylvania; Clinical Professor of Nervous Diseases in the Woman's Medical College of Pennsylvania and in the Philadelphia Polyclinic.

J. DUTTON STEELE, M.D.,

Associate in Medicine, University of Pennsylvania, Philadelphia; Physician to the Presbyterian Hospital.

ALFRED STENGEL, M.D.,

Professor of Clinical Medicine in the University of Pennsylvania, Philadelphia

CONTENTS OF VOLUME II.

PROGRESSIVE MEDICINE.

JUNE, 1908.

HERNIA.

By WILLIAM B. COLEY, M.D.

Inguinal Hernia. Chiene, of Edinburgh,[1] describes a simple operation for uncomplicated oblique inguinal hernia in young adults. He states the rationale of the operation depends upon the following:

1. That for practical surgical purposes all oblique inguinal hernias are primarily due to a congenital or preformed sac.

2. That in young adults suffering from oblique inguinal hernia the valvular action of the muscles guarding the internal abdominal ring will regain its normal action if the cause of the dilatation of the canal be removed.

3. That if the neck of the sac be efficiently dealt with, it is quite unnecessary to interfere with the remaining portion in the inguinal canal or scrotum.

The steps of the operation, which are well shown by the accompanying illustrations, are as follows:

An incision is made half an inch above and parallel to the middle third of Poupart's ligament.

Chiene states that his hypothesis as regards the etiology of hernia is admitted by most authorities at present, in children, and that the works of Stiles, Hamilton Russell, and Murray have gone far toward proving its holding good in adults as well.

Chiene has practised the above described operation only during the last eighteen months, and the results so far have fully confirmed the correctness of the theories advanced by him. He has performed the operation sixteen times, nine times in male adults ranging between nineteen and forty years of age; five times in male children; once in a woman, aged twenty-eight years, and once in a girl, aged eleven years. All cases were carefully traced and the results entirely satisfactory. In three of the male adults local anesthesia was employed. In pointing

[1] British Medical Journal, November 16, 1907.

2

out the advantages of the method, he states that it can be quickly and easily performed; the patient need not be confined to bed for more than ten days or two weeks; complications due to extensive dissections of the sac and manipulations or displacements of the cord are avoided, nor has
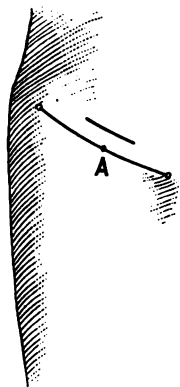
FIG. 1.—Shows relation of incision to Poupart's ligament: *A*, the middle of Poupart's ligament. Figs. 2, 3, 4, and 5 (actual size) show different stages of the operation.

hydrocele developed in any of the cases operated upon. The overlapping of the external oblique, originally introduced by Lucas-Championniere, forms a firm pad over the internal ring without interfering with the
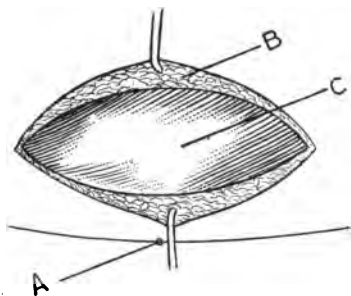
FIG. 2

FIG. 3

FIG. 2.—*A*, the middle of Poupart's ligament; *B*, retracted skin and fascia; *C*, external oblique muscle.
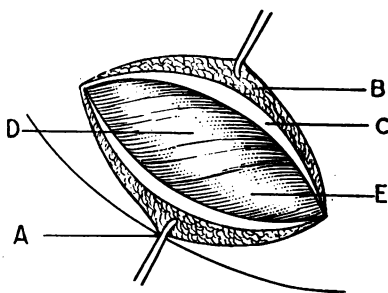
Fig. 3.—*A* and *B*, as above; *C*, external oblique muscle retracted; *D*, fibers of internal oblique muscle; *E*, fibers of cremasteric muscle. (The ilio-inguinal nerve is not represented in the drawing.)

action of the underlying muscles. Fixation of the neck of the sac is unnecessary in children, but in adults he always does this to prevent the occurrence of any possible pouching at the internal ring.

The theoretical grounds upon which the operation is advocated, while

in the main sound, do not, I believe, cover the whole situation. The very facts (that I have alluded to) brought out by Murray, are quite to the point, namely, that a previous potential sac in the canal does not in itself constitute a hernia, but that there are other important factors in its eitology, namely, an enlarged internal ring, or increased intra-abdominal pressure. The method advocated by Chiene deals with only one of these factors, the sac itself. It seems to me, if we can decrease the size of the internal ring by suturing the internal oblique to Poupart's ligament, with or without transplanting the cord, we shall be more certain of obtaining a permanent cure, than if we simply obliterate the sac and suture the aponeurosis alone. Chiene's method undoubtedly will cure a great proportion of oblique inguinal hernia in children and probably in young adults, but whether it will cure as many cases as the method of Bassini or its modifications is doubtful. Much larger statistics alone can settle this point.
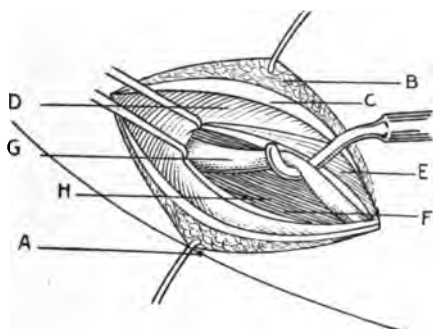
FIG. 4   FIG. 5

FIG. 4.—*A, B,* and *C,* as above; *D,* internal oblique muscle retracted upward after cremasteric muscle has been split; *E,* split cremasteric muscle; *F,* split infundibuliform fascia; *G,* neck of sac freed from cord; *H,* position of cord which is not represented.
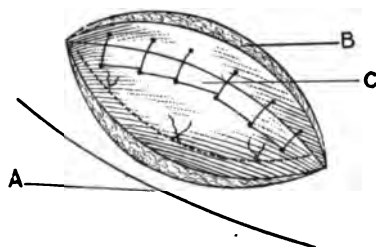
FIG. 5.—*A, B,* and *C,* as above, showing the overlapping of the divided external oblique muscle. The dotted line shows the lower edge of the upper fibers drawn under the lower fibers and retained by three interrupted mattress sutures, the upper edge of the lower fibers fixed by a continuous blanket suture.

In view of the unpleasant experiences so frequently met with as a result of unsatisfactory suture material for the deep sutures in the radical operation for inguinal hernia, Martini,[1] of the Turin Hospital, has devised a new method of suture with extractable sutures which he uses in connection with Ferrari's operation.

After incising the skin and aponeurosis of the external oblique muscle and ligating the sac as high up as possible, according to Bassini, he bluntly tears the fascia transversalis, pushing the cord downward. He then

[1] Arch. f. klin. Chir., Band lxxxii, Heft 4.

supplies four curved needles with threads of silk and starts suture in the manner shown by the accompanying cuts. Martini states that he has employed the procedure in a number of cases of external oblique hernia and in four direct hernias, with excellent results. He states that the method is easily and speedily applied, and sums up its advantages as follows:

1. All pulling and compression of the cord is avoided.

2. The deep inguinal ring, which is frequently the site of a relapse, is obliterated.

3. The inguinal canal, likewise, is obliterated.

4. The cord is made to emerge below, in the neighborhood of the external inguinal ring; this point of exit offers considerable resistance to normal pressure, surrounded as it is by the pubis below and by Henle's band, Colles' band, anterior rectus muscle, etc., internally.

5. The entire abdominal wall is restored in one layer, thus furnishing a strong barrier, capable of great resistance.

6. Not only the borders of the two laminæ of the aponeurosis of the external oblique muscle are joined, but their entire inner surfaces, insuring closer union.

7. Layer suture with its many knots is avoided.

8. In consequence of the compression exerted by the two gauze bolsters, hemostatic ligation, which often endangers the viability of the compressed tissues, becomes unnecessary, and the formation of vacuums, favoring the collection of exudates, is avoided.

9. Extraction of the sutures on the fifteenth day is easily accomplished; the parts brought into apposition have become firmly united by this time.

By removal of the deep sutures the principal cause of disturbed wound healing is removed. This method of suturing the inguinal canal is very similar to one described by George R. Fowler several years ago. If we were unable to obtain sterile absorbable sutures, this method might be of value, but such suture material can be obtained, and is, I believe, far superior to removable suture, however ingeniously applied.

Contents of the Sac in Irreducible Inguinal Hernias in the Female. Corner[1] presents some very interesting observations upon the contents of the sac in irreducible inguinal hernias in the female and true *hermaphroditism*. From the records of 11,800 cases observed at the Children's Hospital, at Great Ormond Street, he found 103 cases of inguinal hernias in the female: 90 reducible, 4 irreducible, and 9 strangulated. Of the latter 13 cases, the sac was found to contain some of the internal genitalia of the female. According to the records of St. Thomas Hospital, 52 cases of irreducible inguinal hernia in female patients were operated upon since 1878. Of these 52, 3 were children, which, added to the 13 of Great Ormond Street Hospital, give a total of

---

[1] British Medical Journal, January 4, 1908.

16 such cases in children. All of the cases in Class I were infants, the youngest aged nine weeks, the oldest aged thirteen months; those of Class II were adults, the youngest being fifteen years, the majority between forty and fifty years of age. Some of the internal generative organs were found in 15 out of 16 cases (94 per cent.) of the infants. Among the irreducible hernias in female adults the internal generative organs were found only four times, or in 8 per cent.

Corner concludes that these tables demonstrate the fact that an irreducible hernia in a female infant is almost certain to contain some of the internal genitalia, while in the adult this may be possible, but is not likely. When irreducible, the hernia of a female child will be found to contain a small round body, the size of a pea, freely movable upon its pedicle. This is the ovary. When irreducible, there is an irreducible non-translucent mass over the external abdominal ring through which it protrudes. The bowel was found in only 15 per cent. of the irreducible hernias in infants; hence in most cases nausea and vomiting are not present. The tumor becomes larger and larger, causing little inconvenience to the infant.

Corner states the diagnosis is easily made. When the case is simply irreducible, the ovary and tube can be easily felt; when strangulated and there is no impulse on crying, the swelling is non-translucent. Corner believes these hernias to be of truly congenital origin, although the hernial contents are not necessarily present at birth. The use of a truss he considers absolutely contra-indicated, operation being the only treatment.

Another most interesting feature of the generative glands found in the inguinal hernial sacs of female children is the fact, pointed out by Corner, that sometimes microscopic examination will show them to be immature testicles, and not ovaries. These cases are true hermaphrodites.

This condition must be extremely rare, as no such case has as yet been observed at the Hospital for Ruptured and Crippled the past eighteen years, although our records show cases of irreducible inguinal hernia in female children. While we have not infrequently been able to clearly diagnosticate hernias of the ovary in female infants, all of these cases were reducible.

There is one condition which Corner does not mention, and which, I believe, might very closely simulate irreducible ovarian hernia and which is more common than the latter, namely, hydrocele of the canal of Nuck.

Crural Hernia. The employment of the inguinal method for crural hernia has recently been warmly advocated by Bardescu.[1] This operation, he states, was performed for the first time in January, 1876, by

---

[1] Arch. f. klin. Chir., 1908, Band lxxxv, Heft 2.

Annandale, of Edinburgh, in a case of double hernia (inguinal and crural) on the same side. The result was so satisfactory that, a year later, Annandale decided to employ the method in a case of simple crural
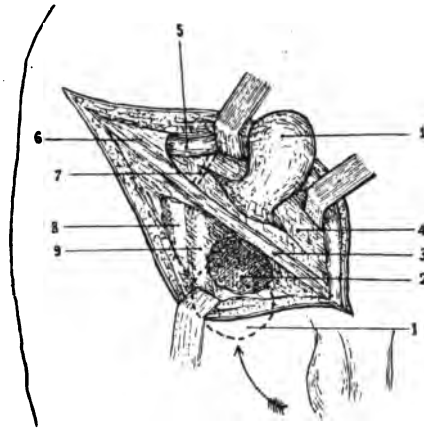
Fɪɢ. 6

hernia. The result, likewise, was excellent. Considerable time elapsed before others took up the procedure. In 1892 Ruggi, of Bologne (Italy), systematized the operative technique and tried to show the advantages of treating femoral hernia by the inguinal route. Since then a number
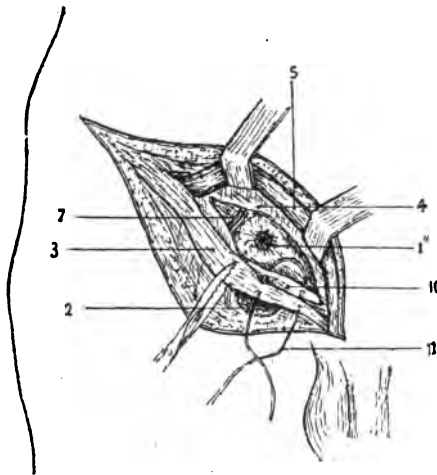
Fɪɢ. 7

of others have taken up the method, but, in spite of the good results obtained, it seems to have been reserved for exceptional cases only.

Bardescu states that he has practised the inguinal method since 1896, at first with considerable reserve, until experience gradually overcame all doubt and he now prefers the method and uses it in all cases.

The various steps of the operation are as follows:

Incision of skin (about 10 cm. in length) and exposure of hernial sac (Fig. 6); opening of the inguinal canal—the scissors are introduced through the external inguinal ring, below the aponeurosis of the external oblique, and the aponeurosis.is split open the entire length of the canal.
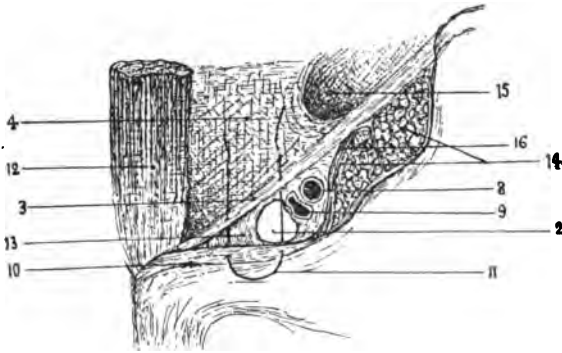
Fig. 8

The internal oblique and transverse muscles are lifted up, the cord is isolated and pushed inward (in the female the round ligament with the surrounding tissues is pushed inward, no attempt being made at isolation). The inferior epigastric artery and vein are recognized by their transparency or by palpation. The transverse fascia is opened so that direct access is gained to the crural ring above the hernial sac. The
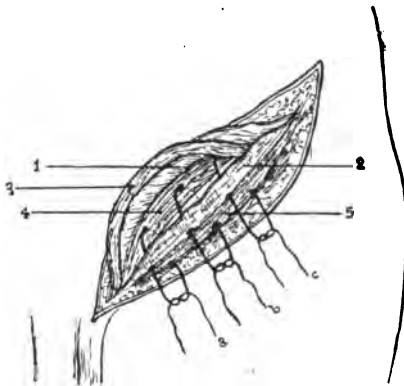
Fig. 9

epigastric vein and artery are divided between two ligatures, should they prevent a sufficiently wide opening of the transverse fascia. Preparation of the sac is continued through the opening in the transverse fascia, until it is completely freed and can be brought into the inguinal region below Poupart's ligament. This is easily feasible in reducible hernias and

those of moderate size. In hernias of large size the peritoneum has to be primarily opened through the inguinal region, after which first the content of the sac and then the sac itself are reduced.

In cases of incarcerated hernia containing gut, the sac is opened from the crural region and the fluid evacuated—best by absorption by means
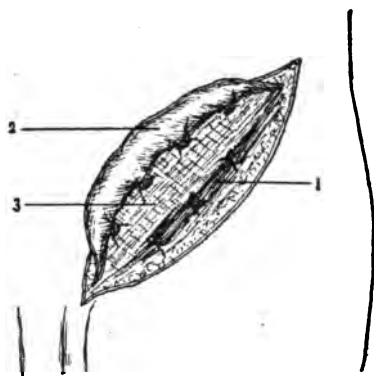
Fig. 10

of sterile compresses. Then the peritoneal cavity is opened from the inguinal region, the protruding organs are examined, the cause of the strangulation is removed, and the gut replaced (Fig. 7).

After the contents of the sac have been treated in the manner described, the empty sac is dissected free, as high up as possible, and resected and the peritoneal cavity closed (Fig. 8). After this Cooper's and
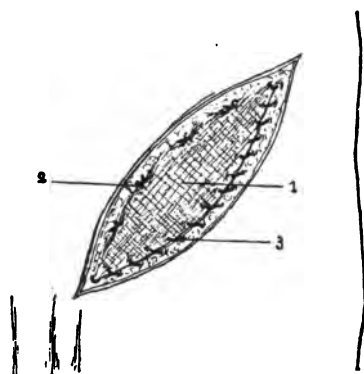
Fig. 11

Poupart's ligaments are exposed and brought into close contact by means of a stout catgut suture placed so as to almost completely surround the crural opening, as shown in Fig. 8. Fig. 9 illustrates the manner of occluding the crural opening. If it is not necessary that the wound remain open, as in infected incarcerated hernias, the inguinal wall is

reformed. In this procedure Bardescu follows in the main Bassini's method. First, the transverse fascia above the stump of the sac is sutured; then three to four U-shaped sutures are placed in the lower border of Poupart's ligament, surrounding the latter. These layers form the posterior wall of the inguinal canal back of the cord. The elements of the cord are transplanted above the posterior wall; and, above the cord, the anterior wall of the inguinal canal is formed by means of suture of the aponeurosis of the major oblique muscle (Figs. 10 and 12).

Bardescu has used the above-described procedure 23 times in 22 patients, 6 men and 16 women. Seven of these cases were reducible hernias, 4 in the male, 3 in the female; 6 were irreducible, 1 male and 5 females. In all of the latter cases the omentum formed the contents of the sac; only in 1 instance was an additional loop of small intestine found.
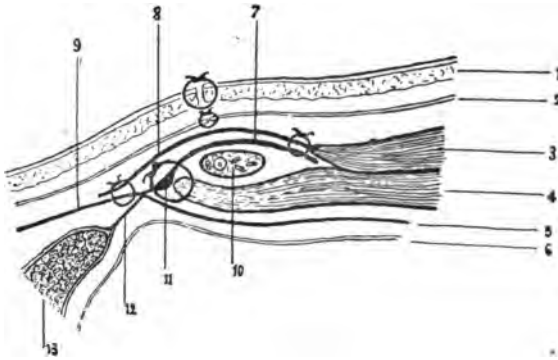
FIG. 12

Bardescu's statistics show 10 cases of incarcerated hernia, 9 of which were observed in women. One of these cases was a double hernia, incarcerated on the left and irreducible on the right side. In another case the tube alone was found incarcerated in the sac, a rare occurrence, as Bardescu points out, he having been able to find but 7 such cases recorded in the literature.

Gangrene of the gut was seen in 4 cases; gangrene of the omentum in 1. Bardescu states that the seriousness of the lesions noticed in the incarcerated organs was by no means in proportion to the duration of the strangulation, but to the strength of the manipulations previously carried out in attempting reduction. This observation makes him condemn as injurious, brutal, and dangerous all attempts at reduction, which, he holds, should be entirely discarded.

As regards mortality, we find 4 deaths reported, 2 having occurred as a result of lung complications six and eleven days, respectively, after operation; 2 were due to collapse.

Relapse has not been observed in a single instance, although none of the patients has worn a truss after operation. The time of observation has extended beyond one hundred months in some instances; · in most of the cases from fifty to seventy months.

Bardescu considers the inguinal method for crural hernia far superior to the direct methods. The operation is extremely simple and affords a wide and light field of operation, thus rendering possible careful handling of the parts. It offers greater chance of permanent cure, for in opening the peritoneum all adhesions in the neighborhood of the sac can be reached, the sac can be prepared high up, and the most complete and anatomical closure of the crural orifice is obtained.

The Inguinal Operation for Femoral Hernia has also been advocated by Moschcowitz,[1] who describes what he believes to be a new operation for the radical cure of femoral hernia. He states his reason for offering a new method of operation is "not merely a question of exercise of ingenuity on his part, but the result of long-continued dissatisfaction·with the present methods in vogue." He further states that "these methods either violate certain general and accepted principles in the cure of hernia, or, if presumably based on sound principles, theoretically violate these principles in their execution." These principles, he states, are (1) firm closure of the peritoneal investment of the hernia, at the point where it dilates into the general peritoneal cavity; (2) the placing of a firm and permanent barrier of tissue just in front of the peritoneum.

The first principle will, of course, be admitted to be of great importance in all operations both for femoral and inguinal hernia. The second I believe to be theoretical, purely arbitrary, and unsupported by any clinical evidence. It forms no part of the Bassini method for inguinal hernia, which has given practically ideal results, nor is it recognized in the methods practised by Bassini, Berger, De Garmo, and myself, and which have given practically perfect results in femoral hernia.

Of these methods, Moschcowitz states that theoretically they would be ideal, but technically they fail to accomplish the purpose for which they were intended. He states that he has performed this operation dozens of times, but never could satisfy himself that he had actually attained a permanent hold with his suture either of Cooper's ligament or of the periosteum of the pubic bone." He further states that cadaver operations and subsequent dissections·have always amply proved to him the inefficacy of the method. As a confirmation of this theoretical objection Moschcowitz cites a case upon which he had operated for right femoral hernia by De Garmo's method in December, 1904. Repeated examinations had shown a permanency of cure. Yet, in March, 1906, one and one-half years later, while performing laparotomy for another trouble, he examined the condition of the femoral ring and found it possible to

---

[1] New York State Journal of Medicine, October, 1907, p. 396.

"introduce the index finger to the depth of two inches, practically to the saphenous opening." Here, therefore, he observes, was a case of so-called radical cure for femoral hernia, which would have been pronounced as such by everybody after an external examination. The cure, however, he states, was evidently only an apparent one, as there was again a sac of a depth of two inches, allowing ample opportunity for a recurrence or strangulation.

Practically the same objections as urged by Moschcowitz have already been advanced by Bacon, and have been discussed at length in a previous issue of PROGRESSIVE MEDICINE, June, 1907. I will only very briefly repeat that these objections are almost entirely theoretical. The only true criteria of the ideal operation for femoral or inguinal hernia, in my opinion, are (1) practical results as regards permanency of cure; (2) simplicity of technique, including freedom from risk. · Judged by these standards, the simpler operation for femoral hernia advocated by Bassini, De Garmo, and the purse-string suture method practised by Cushing, Marcy, Berger, and myself, have shown such uniformly satisfactory results as to far outweigh any theoretical objections.

Bassini reported 60 cases of femoral hernia with no relapses, and 41 traced from one to nine years. De Garmo has reported 111 operations, with but 1 relapse. Up to the present time I have operated upon 144 cases of femoral hernia, with no death and only 1 relapse. Fifteen of these cases were operated upon by Bassini's method, with 1 relapse, and in 129 the purse-string suture was employed without a single relapse. A large number of these cases are well from ten to seventeen years.

The technique of these methods is far simpler and more easily learned than that of any of the substitutes which have recently been so freely offered.

The operation proposed by Moschcowitz very closely resembles several other methods of closing the femoral canal through the inguinal opening; among these may be mentioned the method of Ruggi, Lotheissen, Gordon, and Bardescu. It is briefly as follows:

A skin incision about 2 inches in length is made parallel with and about 1 inch above Poupart's ligament; then the aponeurosis of the external oblique is divided and Poupart's ligament exposed, as also the conjoined tendon and internal oblique and transversalis muscles by retraction of the flaps.

Moschcowitz[1] describes the various steps of the operation as follows:

1. For most cases a cutaneous incision, 2 to $2\frac{1}{2}$ inches in length, parallel with and about 1 inch above Poupart's ligament, will be perfectly satisfactory; in exceptional instances, to be explained later, a short vertical incision may be added at the internal end (Fig. 13).

[1] New York State Journal of Medicine, October, 1907.

2. Division of the aponeurosis of the external oblique in the direction of its fibers.

3. Retraction of the lower flap exposes Poupart's ligament, the posterior edge of which forms a convenient guide to the neck of the sac. Retraction of the upper flap exposes the conjoined tendon and the internal oblique and transversalis muscles. These two muscles, as well as the exposed round ligament (or spermatic cord) are retracted upward with a blunt hook, exposing the transversalis fascia; this is also incised and retracted, in order to expose the neck of the sac (Fig. 14),
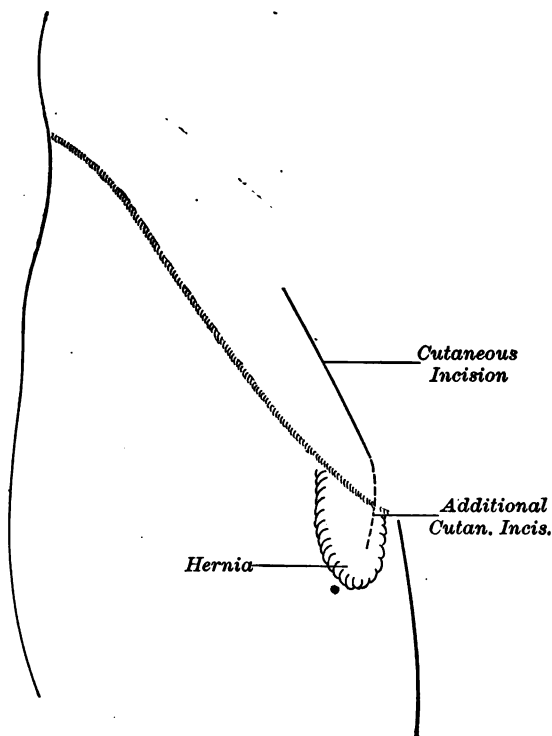
FIG. 13.—Showing the ordinary cutaneous incision; dotted line indicates the occasionally necessary supplementary incision.

4. The sac, just before it dips beneath Poupart's ligament, is now incised, and its contents are reduced in the usual manner. Whatever operative procedures are indicated in adherent or strangulated forms can be performed; the strangulating ring can be easily incised under the guidance of the eye, and abnormalities of the obturator artery may be readily avoided.

5. A dressing forceps is introduced through the internal femoral ring to the fundus of the sac, and if no adhesions are present (particularly if the hernia is of fairly recent origin) the sac can be entirely

everted and pulled through the ring, so that the hernia is converted into a direct inguinal hernia (Fig. 15). If this simple procedure is impossible, the sac may be dissected out, either by retracting the lower skin flap or through a short perpendicular incision continuous with the original incision; or the sac may be cut off at the internal femoral ring, and the distal part can be obliterated by a small incision over the saphenous opening, with subsequent drainage. The neck of the sac is now obliterated flush with the peritoneum, either by transfixion and ligature or by suture.
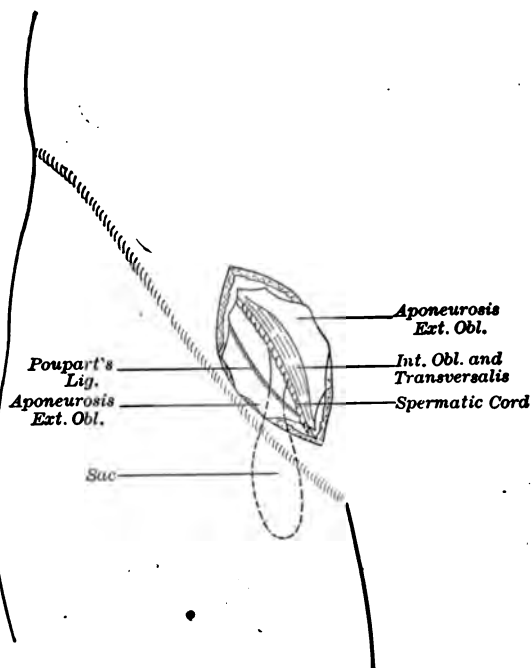
FIG. 14.—Shows the parts after division and retraction of the aponeurosis of the external oblique.

6. Closure of the internal femoral ring. In order to expose the ring properly, the peritoneum is pushed bluntly upward with a broad flat retractor. When this is done the following anatomical structures are presented: Anteriorly Poupart's ligament, externally the external iliac vein and the deep epigastric vessels, internally Gimbernath's ligament, and posteriorly, but on a slightly upper level, Cooper's ligament and the pectineus muscle and fascia; while above is the retracted peritoneum, transversalis fascia, internal oblique and transversalis muscles, and aponeurosis of the external oblique. The internal femoral ring is thus perfectly exposed, and with the greatest ease and safety we may proceed to close it. With a strong, small, full-curved needle, armed with strong chromicized catgut, sutures are passed between

Cooper's ligament and the periosteum of the pubic bone on the one hand and Poupart's ligament on the other, over the site of the femoral ring (Fig. 16).   Then the sutures are tied, and in this way Poupart's ligament is approximated to the pubic bone, thereby completely obliterating the internal femoral ring.   Two or three sutures will usually suffice to close the ring.   The most external suture goes as near as possible to the external iliac vein, without constricting it, while the most internal suture includes also Gimbernat's ligament (Fig. 17).

7. In order to obviate the occurrence of an inguinal hernia, a predisposition to which has been created by the displaced Poupart's ligament,
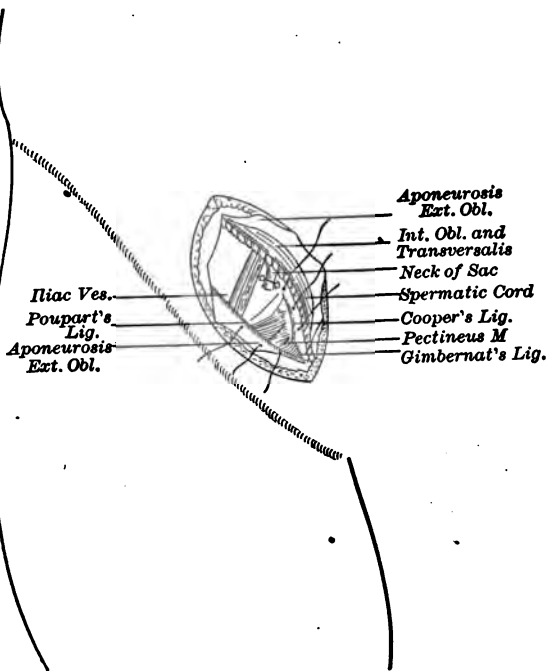
FIG. 15.—Shows the hernia after it has been converted into a direct inguinal hernia.

the next series of sutures is passed in the following manner: The round ligament, or spermatic cord, having been replaced into its normal position, four or five chromic gut sutures are passed, including the internal oblique and transversalis on the one hand and Poupart's ligament, just anteriorly to the first series of sutures, on the other, allowing the round ligament or cord to emerge at the inferior angle.   When these sutures are tied, it will be seen that any possibility of a new formation of an inguinal hernia has been excluded (Fig. 18).

8. Suture of the aponeurosis of the external oblique and of the skin.
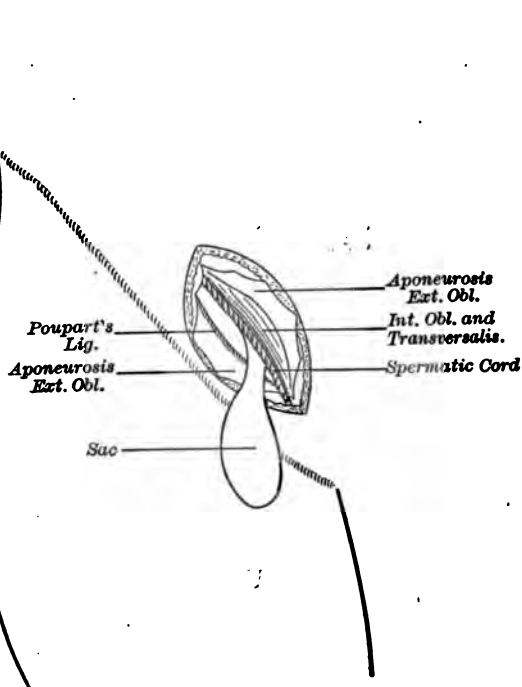
FIG. 16.—Shows the parts after the neck of the sac had been ligated and the peritoneum retracted. All the deep structures are exposed and three sutures are passed to close the internal femoral ring.
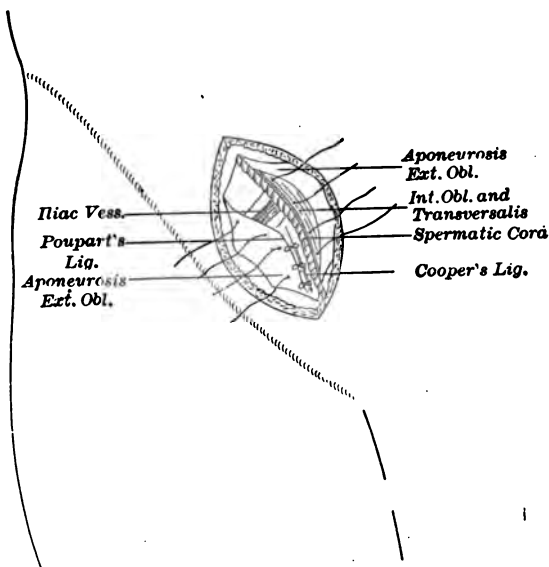
FIG. 17.—The deep sutures closing the internal femoral ring have been tied, and four sutures have been passed to prevent the occurrence of an inguinal hernia.

Moschcowitz concludes that the advantages of the operation are so obvious that it is surprising that it has not been thought of long ago. Although it may be shown that others have done the operation independently, he believes that his communication will call attention to "a better, safer, and easier method for the radical cure of femoral hernia."

That it is easier than the purse-string method, or even Bassini's method, a glance at the six diagrams causes one to doubt; that it is better and safer, time and further experience alone can prove. Certainly much further data will be required than the 29 cases reported
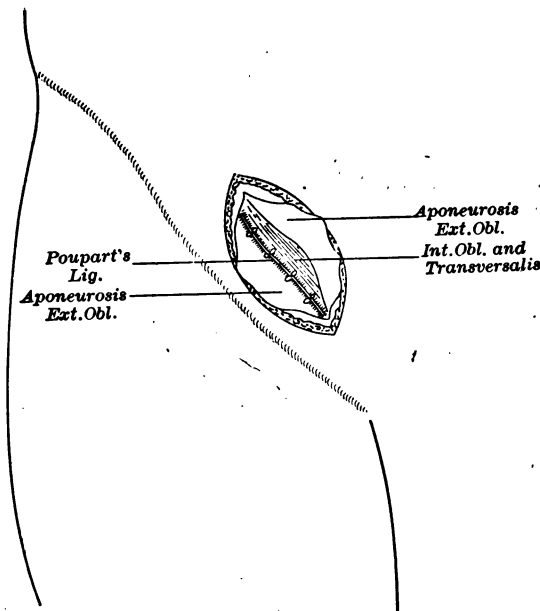
FIG. 18.—Condition after the approximation of the internal oblique and transversalis to Poupart's ligament. To be followed by suturing the cut edges of the aponeurosis of the external oblique and of the skin.

by the author as operated upon within a period of a little over a year. One cannot lose sight of the fact that a direct hernia into which the femoral "is converted" is one of the most difficult of all varieties to cure.

Umbilical Hernia. The great superiority of the Mayo[1] method of radical cure for umbilical hernia has been further demonstrated by a recent report of final results obtained at the Mayo clinic in Rochester. The method itself has already been described in a previous volume of PROGRESSIVE MEDICINE, and it will not be necessary to more than

[1] Journal of the American Medical Association, June 1, 1907.

state that it consists in a transverse elliptical incision, complete removal of the navel and surrounding fat, overlapping of the transverse opening in the fascia by a series of mattress sutures so placed that the lower flap passes underneath the upper, the latter overlapping to the extent of 1 to 2 inches. To guard the needle as it enters the peritoneal cavity, the bowl of a large tablespoon has been found of value. The needle and thread is drawn down and out of the hernial opening. A firm mattress stitch is now caught in the upper edge of the lower flap ¼ inch from the margin, the needle is then carried back through the hernial opening into the peritoneal cavity and made to emerge ⅓ inch lateral to the point of original entrance. On each side of this is introduced a similar mattress suture. These three sutures are drawn tight, pulling the entire thickness of the aponeurotic and peritoneal structures behind the upper flap. The margin of the upper flap is now retracted to expose the suture line, and if any gap exist, it is closed with catgut sutures. The upper flap is then sutured to the surface of the aponeurosis below by continuous chromicized catgut suture and the superficial fat and skin closed.

The object of Mayo's report, as stated, is to call attention to the ultimate results, as the operation has now been practised more than thirteen years, during which time 126 umbilical hernias and fully as many postoperative hernias, especially those following appendicitis and gallstone operations, have been operated upon by this method, almost without relapse. Of 88 patients with umbilical hernia operated upon between 1894 and 1905, 75 were traced, 1 had a partial relapse, which, however, did not inconvenience the patient. Another patient was supposed to have suffered a relapse, but operation revealed the presence of a second opening above and lateral to the closed umbilical opening.

McGavin, of London,[1] reports a series of cases of *abdominal hernia*, in which he has employed the filigree-implantation method as advised by Bartlett, of St. Louis. The accompanying illustrations (Figs. 19 to 22) show the adaptation of the method to meet the difficulties of individual cases.

McGavin has used the method in upward of a dozen cases. He states that "the situation of the filigree will usually be found to be determined not by any stereotyped rule, but by the conditions presented by each individual case, and although it is advisable to place the filigree as close as possible to the abdominal cavity, it will be found to be at times a matter of impossibility to place it actually on the peritoneum, owing to the firm adhesions that often exist between this structure and the transversalis fascia in cases of old-standing umbilical hernia and in some cases of ventral hernia following operation or accidental trauma.

[1] Lancet, November 23, 1907.

The attempt to separate these structures in such cases in order to lay
the filigree upon the peritoneum results in the tearing of holes in the
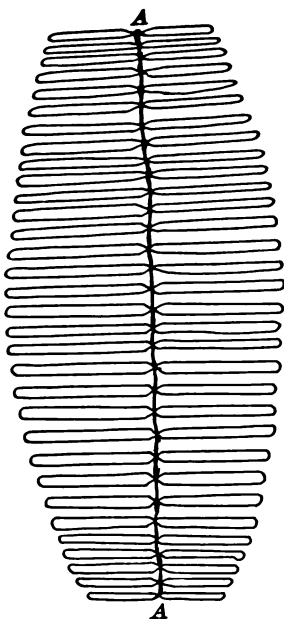
Fig. 19.—The diagram shows the pattern of filigree used in these cases, and is
drawn to one-third the size of that employed in Case 4: *A A*, midrib of filigree.
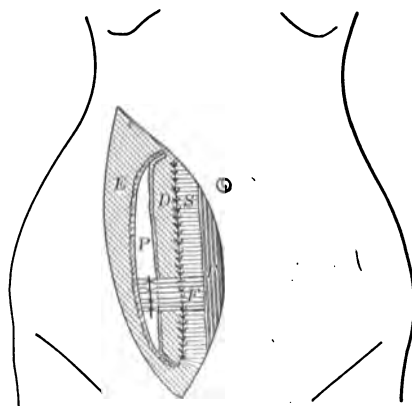
Fig. 20.-- *D*, divorced strip of external oblique aponeurosis sutured to (*S*) posterior
sheath of rectus muscle; *E*, external oblique muscle; *R*, rectus muscle; *P*, peri-
toneum covered actually in whole area, shown by *F*, filigree, a portion only of which
is here shown diagrammatically *in situ.*

latter and in most troublesome and persistent oozing.   Time is thus
lost, shock is increased, and suppuration is favored.   However, in the

case of median hernias above the umbilicus, or in umbilical hernia and for two inches lower down than the umbilicus, the space between the
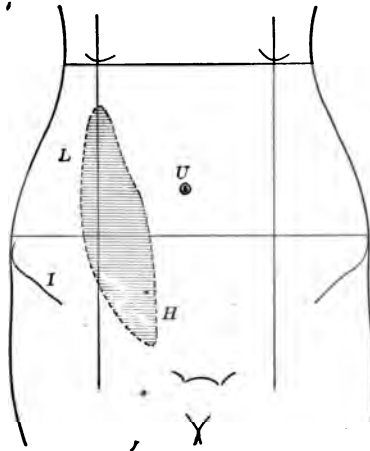
FIG. 21.—The shaded portion in this diagram represents the area of the hernial protrusion in Case 4.

rectus muscles and their posterior sheaths is admirably suited to the purpose. The separation of these structures is a very simple matter;
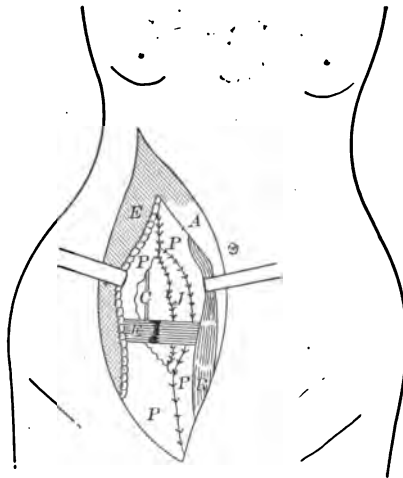
FIG. 22.—*R*, rectus muscle partly covered by *A*, representing oblique aponeurosis and anterior sheath of rectus muscle; *E*, external oblique muscle; *C*, cecum sutured on inner side to small intestine (*I*), and adherent on outer side of *P*, peritoneum; *P*, conjoined peritoneum and posterior sheath of rectus muscle sutured to small intestine (*I*); *F*, portion only of filigree shown *in situ*.

there is little oozing to endanger the union of the wound, and the bed so formed for the filigree is firm and resistant.

With regard to the filigree itself, McGavin states that he now uses the same gauge of wire for inguinal, umbilical, or ventral hernia, viz., No. 28 standard wire gauge, having the same number of loops to the inch, *i. e.*, eight.

McGavin concludes by stating his belief that this method constitutes the simplest, quickest, and surest means yet devised for controlling cases of hernia of all varieties (with the possible exception of femoral hernia) hitherto considered incurable.

Personally, I have never used the filigree method for abdominal hernia, holding the opinion that practically all cases which offer any hope of operative relief may be cured by the overlapping operation of Mayo's with some modification of the same. It is possible that there are cases in which this method cannot be used, that may be benefited by the filigree implantation. Careful reports of a larger number of cases will settle the question.

Our knowledge of the origin of *lateral abdominal hernia* is as yet rather limited. Baracz[1] reports 7 cases of lateral ventral hernia which he collected from the literature, and adds two personal observations.

A study of these cases shows all of them to have occurred after a previous acute attack of *spinal paralysis;* there was present, invariably, partial paralysis of the lateral (oblique) abdominal muscles, usually accompanied by total or partial paresis of the corresponding lower extremity, as well as of the muscles of the back on that side. In some instances paresis of both lower extremities was noted, from which observation it must be assumed, Baracz states, that the poliomyelitic process was localized in the upper lumbar or lower dorsal portion of the spinal cord. Paresis in the opposite part of the body was never seen.

Baracz holds that all hernias occurring in the lateral abdominal muscles, between the costal arch and the crest of the ilium on the one hand, and between anterior and posterior axillary line on the other, may be looked upon as lateral ventral hernias. They are due either to congenital defects of the oblique abdominal muscles, or, as has been more frequently the case, to partial paresis of the lateral abdominal muscles caused by a past attack of acute anterior poliomyelitis; personally, he believes the latter to be the far more frequent, if not only cause of these hernias. These hernias, in reality, are not true hernias, inasmuch as there is no real hernial sac, but merely a localized weakening of the abdominal wall. It has been shown, he states, that the originally rather diffuse paresis of the lateral abdominal muscles becomes localized in the course of years. Not infrequently this paresis has been found to involve the straight abdominal muscles as well, but the latter, being stronger than the oblique, offer greater resistance to the abdominal pressure, which accounts for the hernias not occurring in this region.

---

[1] Arch. f. klin. Chir., 1908, Band lxxxv, Heft 1.
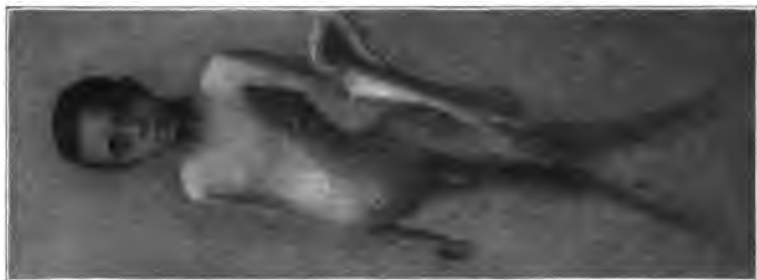
Fig. 25

Fig. 24

Fig. 23

He states that bilateral pseudohernias following poliomyelitis are comparatively rare. Baracz believes most careful neurologic (electric) examination should not be omitted in these cases, as it is in this way only that further knowledge of the subject can be gained.

Baracz states, it is clear that surgical treatment of such cases is most difficult, if at all practicable. It is impossible to cover such enormous muscle defects with flaps of neighboring muscles, especially as the latter, too, are usually paralyzed. As a rule, mechanical treatment only can be considered in these cases.

In his "Contribution to the Etiology of Lateral Ventral Hernias," Blauel[1] (v. Bruns' Clinic) expresses the opinion that *acute anterior polio-myelitis* may be looked upon as the usual cause of lateral ventral hernia. He reports a case observed at Bruns' Clinic in which a definite history of this disease, noted eight months before, was obtained, and refers to four cases of lateral ventral hernia, described in 1905 by Ibrahim and Hermann, in all of which spinal paralysis and dilatation of the abdominal wall due to atrophy of the abdominal musculature existed beyond any doubt. While the histories of the cases of Quervain, v. Baracz, and Borshardt do not contain any absolutely definite data regarding a primary spinal lesion, all the symptoms are so similar that Blauel believes there can hardly be any question as to the hernias being due to the same cause.

Blauel states that these lateral ventral hernias differ from all other forms of ventral hernia not only by their special mode of development, but principally by the fact that they present only a circumscribed, hernia-like dilatation of the abdominal wall, and not any true hernial sac and ring.

A new operation for *sliding hernia of the cecum and sigmoid* has recently been described by Fiaschi,[2] of Sidney. Fiaschi calls attention to the frequency of recurrence after the ordinary operations for sliding hernia, and in his opinion "the only way to make the radical cure of sliding hernia permanently successful is to anchor the intestine neighboring the sliding to the abdominal parietes, just as you anchor a floating kidney or a prolapsed rectum."

This analogy between prolapse of the rectum and sliding hernia led him to conclude that colopexy, which has been so successful in the former, would be equally useful in sliding hernia if combined with Bassini's operation. In applying colopexy to the treatment of sliding hernia, he proposes some modifications, which he states as follows: "First, as we operate hernia, and in patients with great endoabdominal pressure and weak abdominal muscles, we should not expose our patient to the risk of a ventral hernia, and the McBurney's gridiron incision

[1] Beitr. z. klin. Chir., 1907, vol. liv, Nr. 1.
[2] Australasian Medical Gazette, November 20, 1907.

should be substituted for the incision through all layers. Lenormant objects to this as not giving sufficient room, but with good assistants such difficulty can be overcome. Secondly, the extent of peritoneal denudation of the iliac fossa can be reduced to one-half of that proposed by Lenormant, as the weight of intestine to be supported in sliding hernia is certainly much less than one-half that of prolapsed rectum. By so doing Lenormant's objection to McBurney's operation will have less force. The objection of the peritoneal denudation is that by attaching the intestine to the muscular and fascial structures of the iliac fossa we obtain far stronger and firmer adhesions."
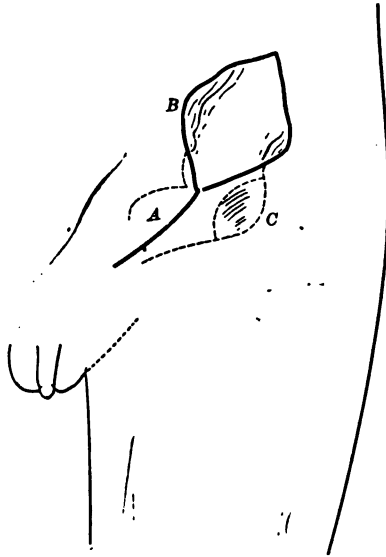
Fig. 26.—Diagram of operation for sliding hernia: *A*, incision for Bassini's operation; *B*, McBurney's incision opened out, showing colon at the bottom; *C*, lozenged area of peritoneal denudation, where the pelvic colon is attached to the muscles of parietes and of iliac fossa.

Fiaschi has operated upon a very large sliding hernia by this method; up to the date of writing the result has been perfect. He first completed the hernia operation, employing Bassini's method, and then made a McBurney incision in the left iliac region, similar to that for an appendicitis operation. He "then dissected a portion of the parietal peritoneum near the iliac fossa, leaving exposed a lozenged surface 1½ inches long. After carefully watching how much of the colon was to be drawn, so as to fix it in a manner that no future hernia could possibly occur, the outer surface of it was attached to the fasciæ and muscles of the parietes by interrupted No. 1 chromicized catgut sutures. The abdominal walls were closed as usual. Recovery was uninterrupted."

Hernia of the Uterus. Hilgenreiner,[1] up to 1905, was able to find but
37 such cases reported in the literature. The condition is most often
found in middle-aged women who have borne children. In nearly one-
half of the cases reported the trouble was associated with defects and
malformations of the genital organs, *i. e.*, uterus bicornis, uterus bipartis,
uterus complex, absence of one ovary, or pseudo and true hermaphro-
dism.

The uterus has very seldom been found alone in the sac, but usually
in conjunction with the tube or ovary or with a portion of the bowel; in
6 instances a loop of small intestine was present. In 8 cases in which the
condition was complicated with pregnancy, the diagnosis was made before
operation, but rarely in the other cases. Careful bimanual examination,
together with the history of the case, should generally enable the surgeon
to make the diagnosis. The conditions most likely to simulate hernia
of the uterus are, hernia of the tube and ovary, irreducible omentum, and
extra-uterine pregnancy.

Treatment. The hernia is usually irreducible, and early operation is
the only treatment to be considered. The result of the operation depends
usually upon whether the uterus is gravid or not. In the 8 cases asso-
ciated with pregnancy Cesarean section was performed in 5, the child
living in each instance, while in 4 out of the 5 the mothers died. It
should be stated, however, that all these cases occurred in pre-antiseptic
times. In 3 of the cases the hernia had become incarcerated.

If operation is not too long delayed, the prognosis should be good.

Volvulus of the Great Omentum. Lejars[2] reports a case of volvulus of
the great omentum, which he believes to be the first one in which the
diagnosis was made before operation. The patient, a man, aged thirty-
seven years, was admitted to the hospital on a diagnosis of appendicitis
on the eleventh day. He had had a right inguinal hernia for twenty
years, which had been controlled by truss. He was suddenly seized with
colic and diffuse pain throughout the abdomen, vomiting and slight rise
of temperature, without constipation. The pain finally became localized
in the right iliac fossa flank. Palpation showed a large mass in the right
half of the abdomen extending from the crural arch to the umbilicus. It
was slightly nodular, non-fluctuating, and sensitive. The lower part
of the tumor seemed to be connected with the contents of the hernia
by a thick cord, crepitating a little under the finger, but not tender.
There was dulness over the entire region of the tumor and hernia. The
diagnosis of volvulus of the great omentum was made principally on
basis of the connection between the abdominal tumor and the hernia and
the relative mildness of the symptoms. Operation showed that part
of the omentum involved in the hernia twisted, and close to the trans-

---

[1] Berl. klin. Woch., 1906, Nr. ii.
[2] Semaine Médicale, Paris, vol. xxvii, No. 7, pp. 73 to 84.

verse colon the entire mass had become twisted three times around its axis. The torsion was easily corrected and the mass cut away just above, together with the appendix, which was adherent to the mass. The patient made a speedy recovery.

Lejars states that in the 66 cases which he found reported, the volvulus in the majority of cases occurred with a right inguinal hernia, in others with an empty hernia or without hernia. Seven of the cases died. He states it is wise to operate as soon as the condition is recognized, and to examine the omentum up to the transverse colon, as there may be other points of torsion.

Incarcerated Prevesical Hernia. Jaehne[1] publishes a case of recovery after operation for incarcerated prevesical hernia, necessitating resection of 20 to 25 cm. of small intestine. He states that only six other such cases have been reported in the literature.

Internal hernia, which term, according to Brösicke, includes all hernias that develop within normal or abnormal peritoneal pockets, in so far as the latter have been formed in a physiological manner, have been divided into five groups by Wilms, viz., (1) hernias of omental sac, epiplocele; duodenojejunal hernias (hernias of Treitz); (3) pericecal hernias; (4) perivesical hernias, and those of Douglas; (5) intersigmoidal hernias.

These hernias are exceedingly rare and the majority of those reported have been accidentally discovered at autopsy. Only 39 cases have been clinically observed. Of these, 17 were operated upon, and only 9 were cured.

"The Treatment of Gangrenous Hernia" is the subject of a recent, very exhaustive paper by Hesse[2] (v. Bruns' Clinic, Tübingen). He has compiled very complete international statistics and by comparison of the results obtained by the various operators with the two competing methods, i. e., resection and the establishment of an artificial anus, has conclusively proved the superiority of the former procedure.

At the Tübingen Clinic, from January 1, 1900, to October 1, 1906, 157 cases of incarcerated hernia were observed. In 56 (23.34 per cent.) the gut had become gangrenous. Of these, 40 were treated by primary resection, with 19 deaths (47.5 per cent.); 3 were treated by artificial anus, with 3 deaths (100 per cent.); 4 were treated by exclusion of the gut, with 4 deaths (100 per cent.); 2 were treated by suture of groove due to the compression, no death; 7 were treated by tamponade, with 7 deaths (100 per cent.). This shows the total number of deaths in this series to be 33 (58.9 per cent.).

Adding to the foregoing the cases observed at v. Bruns' Clinic, from April 1, 1896, to January 1, 1900, as reported by Hofmeister,[3] there

---

[1] Beiträge zur. klin. Chir., December, 1907.

[2] Ibid., 1907, Band liv, Heft 1.

[3] On the Treatment of Gangrenous Hernia by Primary Resection, Beiträge zur klin. Chir., 1900, Band xxviii, S. 671.

results a total of 261 herniotomies for strangulated hernia, 81 (31.22 per cent.) of which were complicated with gangrene of the gut; 43 of these died, giving a total mortality of 53 per cent.

Primary resection was done in 57 cases, with 23 deaths (40 per cent.); artificial anus established in 8 cases, with 7 deaths (87.5 per cent.); exclusion of the suspicious loop in 8 cases, with 7 deaths (87 5 per cent.).

Hesse then refers to Petersen's (Heidelberg Clinic) statistics[1] covering a period of thirteen years, from 1877 to 1900, and showing 51 cases of resection, with 17 deaths (33.3 per cent.); 30 cases of artificial anus, with 22 deaths (77.25 per cent.). Hesse has attempted to bring these statistics up to January, 1906, taking his data from the Annual Reports of the Heidelberg Clinic as follows: From January, 1901, to January, 1906, 24 primary resections were done, with 8 deaths (33.3 per cent.); 8 artificial anus were done, with 7 deaths (87.5 per cent.).

Hesse's collective statistics, comprising the results of 59 operators, shows a total of 860 resections, with 382 deaths, or a mortality of 44.3 per cent., and 604 cases of artificial anus, with 431 deaths (71.3 per cent.).

It may be interesting to compare these end results with those shown by the collective statistics of the following writers:

					Resection.			Artificial Anus.		
					Cases.	Deaths.	Per cent.	Cases.	Deaths.	Per cent.
v. Mikulicz,	1891	.	. . .		68	32	47.1	94	72	76.6
Zeidler,	1892	.	. . .		289		49.1	287	213	74.2
Butz,	1892	.	. . .		219		46.1	204	104	50.9
Akerman,	1899	.	. . .		112		40.1	70	55	78.6
Hofmeister	1900	.	. . .		214		46.3	167	101	60.5

From these data it appears that the mortality of the two operations has been but little improved within the last two decades.

With regard to the application of *local anesthesia in herniotomy*, Hesse refers to the widely differing views and experiences of the various operators. Hofmeister and Petersen came out strongly in favor of local anesthesia, while Mikulicz and Henle declared that according to their experience the dangers of pneumonia had not been lessened by the application of local anesthesia. Hesse believes that, in view of the dangers of general anesthesia, local anesthesia is on the whole undoubtedly preferable, although it cannot be denied that it makes greater demands upon the mind of the patient than inhalation narcosis, and the danger of shock, as repeatedly pointed out by v. Bergmann, v. Eiselsberg, and Lexer, is a factor that can certainly not be ignored.

With regard to the method of anastomosis of the gut after resection, Hofmeister's statistics shows that lateral anastomosis according to v. Frey, was exclusively done. Hesse's material, too, shows that anasto-

---

[1] On the Treatment of Gangrenous Hernia, Deut. med. Woch., 1901, Nr. 8 to 10.

mosis was usually accomplished by this method. The Murphy button was first mentioned in 1901, and was used 13 times in 40 resections.

Hesse is by no means enthusiastic over the use of the button, believing that there is much to be said pro and con, and states, especially with reference to its application after resection of the gut in gangrenous hernia, the experiences of the different operators have been rather contradictory.

Hesse appends a brief report of the 40 cases of resection performed at the Tübingen Clinic within the last six years. Fifteen of these were men, with 11 deaths; 25 women, with 8 deaths; 26 cases were crural hernia: 22 women, 4 men; 12 inguinal hernia: 9 in men, 3 in women.

With regard to the duration of the strangulation, it is stated that in 13 cases gangrene set in after twenty-four hours; or in 24 cases after forty-eight hours, showing how soon after strangulation gangrene may develop, and hence how dangerous it is to attempt taxis in the cases in which strangulation has existed longer than twenty-four hours.

Hesse's concluding remark is: There is but one rational method of treatment for gangrenous hernia, and that is extensive primary resection of the gangrenous gut, while the establishment of an artificial anus no longer comes into consideration as a life-saving operation.

Lumbar Anesthesia. Oehler, assistant to Kümmell[1] expresses greatest satisfaction with lumbar anesthesia, basing his opinion on 1000 cases in which the method has been employed at the General Hospital, Hamburg-Eppendorf, the majority of which were hernias. After using various other preparations, they now employ, exclusively, a freshly prepared and sterilized 5 per cent. solution of tropacocaine, in doses of 1 to 1.5 c.c., to which is added, after sterilization, a drop of suprarenin solution (1 to 1000) per cubic centimeter. With the exception of 1 case, they have never observed any lasting disability to follow lumbar anesthesia.

Oelsner,[2] assistant to Dr. Sonnenburg, reports their experience with lumbar anesthesia in 875 cases in which it has been employed at the City Hospital at Moabit, Berlin, since 1904.

In 114 of these cases pure stovain was used; in 354, novokain suprarenin, and in 407, stovain-adrenalin. In 79 the anesthetic either did not take effect at all, or insufficiently so. Unfavorable results were observed in 3 instances; in 4, paralysis set in which was, however, overcome. In cases of hernia and appendicitis lumbar anesthesia was most extensively used.

In conclusion, Oelsner states that the question of lumbar anesthesia is only in the beginning of its development, and that he considers it a pleasing task to help work out a method that rests upon clear anatomical and physiological basic ideas.

[1] Beiträge zur klin. Chir., 1907, Band lv, Heft 1.
[2] Deutsche Zeitschr. f. Chirurgie, October, 1907.

The Saccular Theory of Hernia, or the theory that practically all varieties of hernia, including femoral, are due to a peritoneal pouch or diverticulum of prenatal origin, which has been for many years strongly advocated by R. H. Russell, of Australia, has been recently confirmed by the investigations of Murray,[1] of Liverpool. Murray states that every medical man has been taught, and probably medical students are still taught, that there are two distinct types of oblique inguinal hernia, one occurring in infancy and childhood, in which the sac is of congenital origin, the other a hernia of adult life, in which it is said the hernia is almost invariably acquired. Murray calls attention to the mistaken impression of most medical men, that the usual type of hernia seen in infants is one communicating with the tunica vaginalis. He states that such type of sac is present in only about 18 per cent. of the cases.

This view is practically confirmed by the reports at the Hospital for Ruptured and Crippled, which show in only 388 cases a sac communicating with the tunica vaginalis, in 1650 operations upon hernias in male children between the ages of four and fourteen years.

Murray gives a report of 200 consecutive and in no way selected postmortem examinations made at the Mill Road Infirmary, Liverpool, upon persons in whom there had been no history or evidence of hernia prior to death.

A potential sac was found in 47 and in these 47 bodies 68 separate sacs, or diverticula, were present; 13 inguinal, 52 femoral, and 3 umbilical. In 16 of the cases more than one diverticulum was present. In most cases the unobliterated portion of the vaginal process was about one inch in length, and the opening of the internal ring was so small as to hardly admit a probe. In other cases the opening was sufficiently large to admit the little finger. The presence of these sacs in persons who had gone through life without ever having had a hernia shows that there must be other factors of etiological importance in the production of a hernia. This he believes to be the size of the opening of the internal ring and the strength of the muscles guarding it.

In direct hernia he believes the primary cause of the hernia to be the presence of a congenital opening in the fibers of the conjoined tendon, through which a peritoneal diverticulum has passed.

In umbilical hernia he considers the following two points important factors in the production of the hernia: (1) a diverticulum at the umbilicus; (2) increased abdominal pressure; umbilical hernia in adult life being due to the acquired increase in abdominal girth, causing the originally small diverticulum to be stretched sufficiently for omentum or bowel to enter.

The apparent lack of harmony between the facts that potential femoral sacs occur with equal frequency in both sexes, and that femoral hernia

---

[1] British Medical Journal, November 16, 1907.

itself occurs with greater frequency in the female than the male sacs, Murray suggests, may be due to two reasons, (1) because in females the lateral expansion of the pelvis which takes place about puberty would tend to widen the mouth of a peritoneal diverticulum in the femoral region; (2) on account of increased pelvic pressure during pregnancy.

This explanation seems to be supported by the fact that femoral hernia appears with greatest frequency during the child-bearing period.

The Vaginal Process of the Peritoneum. St. Cohn,[1] in his "Clinical Studies Regarding the Vaginal Process of Peritoneum," reports two cases of hernia observed at the Surgical Clinic of the Academy for Practical Medicine at Cologne, which are of particular interest in connection with the subject of his paper. Both cases presented a free left inguinal hernia, one with an additional umbilical hernia, and the lower blind portion of the hernia in both cases had become adherent to a large, empty sac of a hydrocele. Neither patient had ever had a hydrocele; hence St. Cohn states the sac could only have been formed by an open vaginal process. The adhesions between the hernial sac and that of the hydrocele were very firm, so that it was almost impossible to separate the two thin sacs. The hernial sacs in both instances were firmly adherent to the cord, especially the blind portion of the sacs, all of which leads to the conclusion, St. Cohn states, that the hernial sacs were of congenital origin, and that the whole structure, as revealed on operation, could have been only an obliteration of the funicular portion of the vaginal process.

St. Cohn's article represents rather an exhaustive study of the subject. His general conclusions are:

1. That lateral diverticuli of the vaginal process of peritoneum may be of congenital origin, producing a congenital ramification of the vaginal process.

2. That also in a changed pathological vaginal process of peritoneum, complete or partial obliteration may occur after the descent of the testicle.

3. That all the various sections of the normal as well as the incompletely obliterated vaginal process are capable of gradual and independent obliteration.

More in particular, St. Cohn's observations show:

1. That a hydrocele is not always a secondary phenomenon, but that the sac is often primarily present, while the collection of fluid (in its concavity) occurs secondarily.

2. The frequent complications of large hydroceles with hernias may be due to an incomplete obliteration of the vaginal process.

3. The percentage of the congenital interparietal inguinal hernias is much larger than appears from the statistics hitherto published. In order to definitely determine the same, it is necessary that in cases where

---

[1] Arch. f. klin. Chirurgie, 1907, vol. lxxxvii.

there is doubt as to the congenital character of the sac, a microscopic examination be made, and that only such cases of interparietal hernia be adjudged as acquired as do not show the smooth muscle fibers on the wall of the hernial sac.

This, in conformity with Sachs' opinion, expressed twenty years ago, that there are no gross anatomical signs that differentiate an acquired external inguinal hernia from a congenital hernia, and whose investigations showed that of all the constituent parts of the cord, only the smooth musculature of the internal cremaster preserves a uniform relation to the wall of the vaginal process. He found that a part of the smooth musculature of the cord, always arranged in fascicles, lies in close proximity to the posterior lateral wall of the process. He believes that only the internal cremaster can be utilized for the definite characterization of the vaginal process, and that, if microscopic examination shows no regularly arranged, smooth, muscle fibers close to the wall of the hernial sac, its congenital nature is at least doubtful.

In this connection St. Cohn refers to the recent very interesting publication by Hansen, based upon 79 operations, 7 of which were performed within the first week after the appearance of the hernia; 20 within the first month; 20 within the first year; 16 after one year. In 5 cases the hernia had been noticed for a longer period, but all were congenital. In 11 cases a direct hernia was found.

In 80 per cent. of the indirect hernias Hansen found a congenital sac.

If these findings are not in accord with the results reported by other authors, St. Cohn states, this must be attributed to the difference in the material examined.

4. The significance of mechanical factors in the development of interparietal hernial sacs of inguinal hernias is of much less importance than is usually believed. Interparietal sacs of bilocular inguinal hernias may be preformed and may attain to the average size of an interparietal hernial sac without the coöperation of any mechanical factors.

5. It is very probable that a factor of etiological importance for the development of congenital interparietal sacs is to be found in the resistance that the protruding vaginal process has to overcome, or, respectively, in the resistance of the aponeurosis of the external oblique muscle. At any rate, anatomical and statistical findings not only do not conflict with such an assumption, but, on the contrary, are explained by the same.

6. So far not a single case of undoubtedly acquired inguinosuperficial hernia has been reported.

7. In superficial as well as other interparietal inguinal hernias the testicle may be in a normal position. The hernial sac, covered with superficial fascia and skin, may be equipped with all the normal coverings, *i. e.*, tunica vaginalis propria and tunica vaginalis communis, muscle cremaster and fascia cremaster.

8. If the descent of the testicle has been completed, a bilocular inter-parietal inguinal hernia may become monolocular as a consequence of an obliteration of the vaginal process from the testicle to the place of ramification.

9. The same mode of development may be assumed for bilocular hydroceles as for interparietal inguinal hernias. The difference between these two conditions arises from a subsequent obliteration of the patho-logical vaginal process above the place of ramification. Obliteration seems to occur more frequently in cases with complete descent of the testicle than in those of ectopia.

10. On the basis of numerous observations it may be assumed that analogous to the hydroceles of the hernial sac, hydrocele of a bilocular sac may develop.

11. The development of an interparietal inguinal hernia out of a bilocular hydrocele, must be looked upon as a very rare occurrence.
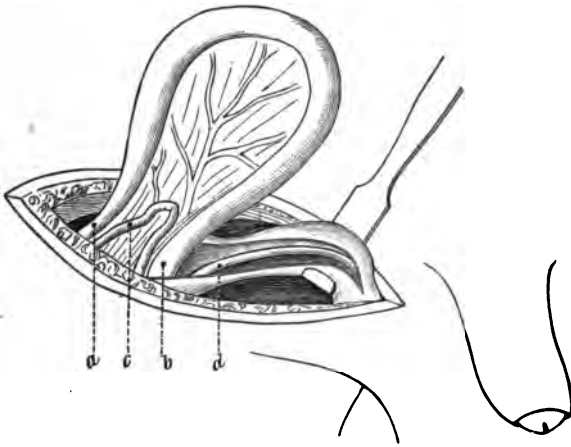
FIG. 27

Hernia of the Ureter. Brunner[1] reports a case of descent of the right ureter into the scrotum, simulating inguinoscrotal hernia. The patient, aged forty-one years, was operated upon by the Bassini method in March, 1907, for what was supposed to be an inguinoscrotal hernia. He had worn a suspensory bandage since the age of ten years, never being able to wear a truss. After splitting the fascia of the external oblique and isolating the funiculus, a supposed hernial sac was felt in the latter. In trying to isolate the hernial sac, there suddenly appeared a long thin structure, but loosely attached to the cord, not adherent to the testicle and situated entirely extraperitoneally. This was promptly recognized as the ureter (Fig. 27). It lay in the funiculus within the tunica vaginalis communis, projected from the abdominal inguinal ring, formed a loop

[1] Deutsche Zeitschr. f. Chir., September, 1907.

about 20 cm. long and returned into the abdominal inguinal ring. Attempts at reduction of the loop of ureter into the abdomen were unsuccessful. Resection and suture were, therefore, decided upon. The patient made a good recovery.

Brunner considers his observation unique. Carli, in 1905, stated "According to our present knowledge, the ureter alone never becomes herniated, but always accompanies an inguinal or crural enterocele or omentocele, and remains outside of the hernial sac."

Undescended Testis. Büdinger[1] in an article on the "Etiology of the Undescended Testis," claims that the method he has practised for a number of years renders possible a much closer scrutiny of the surrounding regions of the undescended testis than other procedures. The observations he has been able to make he believes to be of importance in explaining the arrested descent of the testis, especially as careful anatomical dissection has shown the same conditions in a number of cadavers with retained testis. While in general his procedure does not offer anything new—following the well-known principle of careful closure of the canal after transplanting the testicle, it differs from the usual method in that, after exposure of the inguinal canal, the access above is widened considerably, this step representing a sort of herniolaparotomy, which permits of close inspection of the vaginal process, the neighboring parts of the peritoneum, the scrotal vessels, abdominal portion of the vas deferens, and enables the operator to remove any intra-abdominal impediments that may be present.

He has employed this method in 24 cases of inguinal retention of the testicle, and mechanical obstruction of some sort was found to be the cause of the non-descent of the testis in 15 of these cases, as also in the cadavers in which an anatomical examination was made.

One of the latter, a man, aged forty years, was brought to the hospital with cryptorgenic pyemia, of which he died. Autopsy revealed the following conditions. The connective tissue of the scrotum proved absolutely normal; the hernial sac and tunica vaginalis propria were found loosely embedded; nowhere was there a structure that could in any way be brought in connection with a gubernaculum. The tunica vaginalis propria was greatly thickened, the cavum large and elongated upward into the shape of a diverticulum. A band extended from the upper portion of the tunica vaginalis along the outer side of the testicle and epididymis, in its lower portion becoming one, partly with the tunica vaginalis, partly with the epididymis.

Büdinger states that, while cicatricial adhesions between testicle and epididymis and intestines are given as a cause of retained testicle by all authors, his experience has shown him that, although frequent, these phenomena are much less frequent than those peritoneal changes which,

---

[1] Deutsche Zeitschr. f. Chir., October, 1907.

while having no direct connection with the gland, nevertheless interfere in an unequivocal manner with the motility of the testicle. He believes the adhesions of the testicle itself to represent an accidental localization of an extensive inflammatory process, rather than a cause of the retention of the testicle, it being his opinion that cicatricial retraction of the peritoneum after inflammatory processes that take place prenatally or in earliest infancy, in the vicinity of the inguinal canal, using up large areas of peritoneal covering, is a far more frequent cause of retention of the testicle.

He concludes that of the many theories advanced as to the origin of uncomplicated undescended testis, only heredity and peritoneal adhesions between testicle or epididymis can be at all accepted, although he himself, as just stated, believes peritoneal cicatrices and adhesions not directly connected with the testicle to be the cause of undescended testicle in a large proportion of cases.

Industrial Accidents in Relation to the Development of Hernia. The most elaborate study that has yet been made of hernia in connection with industrial accidents is that of Paul Berger.[1] Berger is undoubtedly the highest authority upon the subject of hernia in France. He has given more careful thought to the question of its etiology, particularly in its relation to accidents, than any other writer in the past or present.

It may be stated at the outset that Berger is a strong believer in the existence of a preformed sac in the great majority of cases of hernia as an important predisposing cause. In discussing the question of traumatic hernia proper, in which the hernia is supposed to be the result of a direct external local injury, he states that it is possible for a rupture to be so produced. He has himself observed, at the Bureau Central in Paris, 52 cases of this kind, a number from the kick of a horse.

Among 130 cases of hernia attributed to an accident in connection with work, which he carefully examined as an expert, 19 were stated to have been due to a violent blow upon the abdomen. Careful examinations of the conditions attending these accidents were made, and in only 7 of the 19 cases was it possible to establish an actual causal relationship. Berger believes it probable that the violent efforts put forth by the individuals in order to keep hold of the foot of the horse while shoeing had actually more to do with the production of the rupture than the kick itself. There probably existed in many of these cases a predisposition to the hernia.

The statistics of Berger show the importance of careful examination of the entire abdomen in reference to the presence of other hernias. In 117 of the 130 subjects who attributed their hernias to an accident, he found actually present 251 hernias. In other words, there were 96 subjects who had multiple hernias, presenting a total of 230. Thus,

[1] Rev. de Chir, April and May, 1906.

of the 117 subjects who claimed that the rupture was first noticed after an accident, 96 had other hernias of the presence of which they were still ignorant.

In a recent paper,[1] entitled "Industrial Accidents in Relation to the Development of Hernia," I have dealt with the same subject.

In order to obtain some original data upon this question, I have analyzed, with the help of Dr. D. H. M. Gillespie, of New York, 5299 cases of hernia in adults, observed at the Hospital for Ruptured and Crippled during the past three years. Of these, 502 were umbilical hernias in the female; 4797 were hernias in adult males—*i. e.*, over fifteen years of age.

The causes of the hernia as given by the patient at the time of examination were as follows: 3102 male adults stated that the rupture had appeared without any known cause. Of these, 2022 had inguinal hernia, single; 976 inguinal hernia, double; 55 femoral hernia; 18 ventral hernia; 31 umbilical hernia. One thousand and fifteen attributed the hernia to lifting or carrying some heavy weight. Of these, 692 were inguinal hernia, single; 291 inguinal hernia, double; 17 femoral hernia; 7 ventral hernia; 8 umbilical hernia. One hundred and fifty stated that the rupture was caused by coughing or sneezing. Of these, 106 were single inguinal hernia; 35 double inguinal hernia; 4 femoral hernia; 2 ventral hernia; 3 umbilical hernia. In 123 cases the cause was attributed to a push, fall, or twist; in 22 to straining at stool; constipation; in 89 to a fall from a height, horse, bicycle, wagon; in 34 to slipping; in 40 to a blow in the groin or abdomen; in 8 to running or jumping. Of 502 cases of umbilical hernia in adult women, in 2 ascites was supposed to be the causative factor; in 3 obesity; in 6 a fall; in 8 coughing; in 195 pregnancy; in 188 the cause was unknown, and in 1 case the hernia had existed since birth.

This analysis shows very much the same facts that Berger has recorded on the basis of his study of a similar group of cases observed in the Société des Bandages in Paris. They show that nearly 70 per cent. of hernias in adult males appear gradually, without any known exciting cause. In these cases there probably existed a preformed sac of congenital origin, which gradually became dilated by the normal increase in intra-abdominal pressure consequent upon the daily routine of life.

In a goodly proportion of the other cases—*i. e.*, nearly 25 per cent. of the total—the cause of the hernia was believed to be lifting or carrying some heavy weight. I think it is fair to assume that in the majority of these cases in which the hernia appeared directly after some unusual effort, there existed some relation of cause and effect. Yet, we may here still assume the presence of a preformed sac, latent and empty up to the time of the unusual effort which increased the intra-abdominal pressure to such an extent as to force a portion of omentum or bowel into

---

[1] International Journal of Surgery, February, 1908.

the empty hernial sac, thus producing an actual hernia. We must not forget that a sac which had been up to the time of the accident without contents does not constitute a true hernia. There must be, or must have been, something in the sac to make it an actual hernia, and just here is where the wide divergence of opinion arises, one group of writers considering, with Kingdon, that a hernia is always a disease, the other group regarding it as always due to an accident. Neither side is quite correct.

Berger states that we know that hernia is, in the great majority of cases, not the result of an accident. Although accidental or professional effort may occasionally be the cause, a hernia is usually the result of a slow process, the true origin of which is a constitutional defect of the abdominal walls. It may be a congenital feebleness, consisting in malformation or weakness of the hernial orifices, the appearance of the hernia depending upon the gradual weakening of the aponeurosis or muscular plane. Under the influence of normal effort, increasingly repeated, these weak places become enlarged and the hernia is produced. In some cases the accident reveals a condition which may have been long present, but was hitherto unsuspected. The accident, then, is not the first, and perhaps not the principal cause, but may have hastened the development of a condition which, otherwise, would not have occurred for some time, perhaps never.

Lotheissen,[1] after a careful review of the question, concludes:

That traumatic hernias are such in which (*a*) all the parts (opening, sac, and contents) develop and protrude as a result of the trauma; or (*b*) the formation of the sac and the protrusion of its contents are at least directly due to the trauma.

The existence of the hernia must be proved immediately or within the very next days after the trauma. This can be determined beyond a doubt only on autopsy.

Traumatic hernias are direct ruptures.

True traumatic hernias, while they may occur at any place in the abdominal wall, are most frequently observed in the inguinal region.

Traumatic hernias may also develop as a result of dilatation of normal openings (inguinal and crural canal) or abnormal slits in the fascia (linea alba, lumbar triangle). To this class belong the artificial hernias of the Russians.

Hernias of accident are to be differentiated from traumatic hernia.

It must be proved that force has been exerted; the abrasions of the skin in the region of the hernial opening, which, however, cannot be considered as absolute proof, as they may be found also in hernias of long standing.

In true traumatic hernias serious symptoms, such as intense pain or collapse, are absent at the time of injury, since the intestines do not

---

[1] Archiv f. Orthopädie, Mechanotherap. u. Unfallchir., 1906, Band lv.

extrude until later, and hence there is no dilatation of the parietal peritoneum. This is present, however, in accident hernias.

In Germany a person with a traumatic or accident hernia receives a rental during the time that he is disabled. This may be for life, in case the patient cannot or will not be operated upon. While the Bureau of Insurance holds that a man's rental cannot be lowered because he refuses operation, the federal court, according to Dumstrey (Leipzig), has decided that a man partly or entirely forfeits his claim to an indemnity if he refuses an operation (especially amputation of a limb) which in itself is without risk, but appears necessary in order to enable him to resume work. This view is not generally shared. In traumatic hernia, with or without truss, an average rental of 10 to 15 per cent. is allowed by the Bureau of Insurance.

In the statistics of accident hernias great differences exist. While Socin and Berger believed that more than 30 per cent. of hernias are "hernies de force," Haegler found in only 2 of the 233 cases of alleged recent accident hernias sufficient signs to cause him to decide that the hernia was due to a trauma, and then fell prey to intentional deceit on the part of the patient and the witnesses in 1, thus leaving but 1 case in 233, or not quite 0.5 per cent.

In my own paper I have gone somewhat at length into the medicolegal aspect of the question, based upon the decisions of European courts. These courts make a distinction between hernias as a result of weakness of the abdominal wall and those resulting from force. They admit that a hernia is the result of force when relationship of cause to effect is proved between the accident and the hernia (1) by the nature of the effort, which must be sudden and violent; (2) by the severe pains which appear immediately after the accident and which necessitate interruption from work.

The trend of surgical opinion is rapidly growing in the direction of considering practically all cases of hernia due to a preformed sac of congenital origin, which forms the great predisposing cause for hernia. This fact has already had marked influence upon many of the decisions in European courts in cutting down greatly the indemnity in cases in which this predisposition was shown to exist. It will undoubtedly have a much greater influence in future decisions, although I believe it safe to say that it will never be sufficient to remove all hernias from the category of accidents.

Results of Operations for Hernia. Bull and myself[1] have reported 2032 operations for the radical cure of hernia performed at the Hospital for Ruptured and Crippled, from May, 1890, to July, 1907: 1528 were for inguinal hernia in the male; 374 for inguinal hernia in the female; total number of inguinal hernias 1902; 20 were for femoral hernia in the male;

---

[1] Journal of the American Medical Association, September 21, 1907

56 for femoral hernia in the female; total number of femoral hernias, 76; 29 were for umbilical hernia; 18 were for ventral hernia; 6 were for epigastric hernia; 1 was for lumbar hernia.[1]

There was a total of 137 cases of hernia in adults, of which 86 of the inguinal hernias were in the female, 30 of femoral hernia, 15 of umbilical hernia, 5 of ventral hernia, 1 of epigastric hernia.

In 24 cases the operation was for strangulated hernia; of these, 17 were in children, 7 in adults. There were no deaths among the children, and only 1 in the adults, which was a strangulated umbilical hernia in a very stout woman.

Of the children 10 were under the age of two years; 6 under one year of age. The youngest was an infant aged thirteen days, with a hernia of fourteen hours, strangulated. An operation for its radical cure was performed. The patient left the hospital in three days and when last seen, five years after the operation, there was no recurrence.

We believe that the unquestionable superiority of Bassini's method to the earlier methods, as well as to those since devised, is shown by the fact that this operation, with slight modifications, is today the operation of choice in practically all the clinics of the world. The secret of the success of Bassini's operation, we believe, depends largely on the fact that it was the first operation in which the attempt to cure the hernia was based on a true appreciation of the etiology of hernia.

In none of the earlier methods was it possible to remove thoroughly the sac flush with the peritoneal cavity. At present we are beginning to appreciate the fact that the great predisposing cause in all inguinal, and probably the majority of femoral, hernias is a congenital or preformed sac, and, on the basis of this, the first and essential principle of a radical cure must be the thorough removal of such a sac.

The principles of Bassini's method are easy of understanding and simple of performance. The first and most important principle consists in the cutting high up of the external oblique aponeurosis, thus giving free access to the internal ring, thereby making it possible to completely remove the sac well beyond the neck, thus obliterating entirely any funicular process. Second, suturing the internal oblique muscle to the shelving process of Poupart's ligament. Third, and least important, as results have shown, is that of transplanting the cord to a higher position than normal, by suturing the internal oblique muscle underneath the cord instead of over it, then covering the cord with the aponeurosis of the external oblique and, lastly, with the subcutaneous fascia and skin.

[1] Since the publication of this report in the Journal of the American Medical Association, just referred to, the number of operations at the Hospital for Ruptured and Crippled, up to March 1, 1908, has reached 2200. Of these, 400 were inguinal hernias in the female, 101 adults and 299 children; 1650 inguinal hernia in the male, all under 14 years of age; 85 were femoral; 35 umbilical; 21 ventral; 8 epigastric; 123 hernia associated with undescended testicle.

That only the first two steps are the essential ones to success is shown by the fact that the last step may be dispensed with almost equally good results. "Suture of the canal without the transplantation of the cord," the other steps being the same as in Bassini's operation, is now regarded by many surgeons as superior to the original or typical Bassini method.

We never transplant the cord in hernia associated with undescended testis for the reason that in these cases we obtain a from $\frac{1}{2}$ to $\frac{3}{4}$ inch longer cord by not transplanting. The early objections to Bassini's method, recently revived by Ferguson, have proved to be of no practical weight. The cord is not injured by the transplantation, orchitis does not follow if the veins are not removed and the operation is properly performed. That there is no functional impairment of the testicle is proved by the fact that many of our boys, operated on when from twelve to fifteen years of age, have grown up, married, and have children.

As to the length of time required for the performance of the two methods, this is practically the same; either can be done in ten minutes in uncomplicated cases, and we have frequently done the operation in seven minutes.

Bassini's method was used in 1209 cases, with 9 relapses. The cord was not transplanted in 441, with 7 relapses. Three of these relapses, however, occurred in the early years—prior to 1892—in cases operated upon by the Socin and Czerny methods, thus leaving only 4 relapses in 438 cases operated upon by the modified Bassini operation, *i. e.*, suture of the internal oblique to Poupart's ligament, without the transplantation of the cord.

The charge is often brought against our statistics, that they deal only with children, in which it is assumed the operation is much more simple and perfect results can be obtained from almost any method. In Ferguson's recent work on *Modern Operations in Surgery* the statement is made that practically all of Coley's operations were in children.

While it is true that a majority of my operations have been in children, 1103, I have also operated upon 930 adults. Therefore my conclusions have not been formed from a study of operations in children alone. I have found the results in children to differ but little from those in adults.

That hernia in children can be cured by any method, no matter how indifferently performed, is a mistaken view, as is shown by the earlier statistics of the Hospital for Ruptured and Crippled, containing a group of 20 patients operated on between 1888 and 1890, of which 40 per cent. relapsed within the first year. My own cases show 6 relapses in 1103 operations in children and 14 relapses in 930 cases of adults. The majority of the relapsed cases in adults occurred in direct hernia, which is a type of hernia very difficult to cure by any method of operation. In this variety of hernia the Bassini method proper is still performed by the great majority of surgeons, inasmuch as only by transplanting the

cord are we able to make an efficient closure of the opening above the pubic bone.

At the Hospital for Ruptured and Crippled 1528 male patients with inguinal hernia have been operated on. In 646 of these cases the sac was of the so-called acquired type, in which there is no communication with the tunica vaginalis; in 363 the sac was of the so-called congenital variety, in which there is communication with the tunica vaginalis; in 519 cases the type of sac was not stated.

All of these patients were children, in many of whom the hernia had been noticed since birth. Hence it is fair to assume that in a great majority the sac was of prenatal origin, irrespective of the fact whether it communicated with the tunica vaginalis or not.

INDICATIONS FOR OPERATION. Although there is a growing tendency at present, especially among British and French surgeons, to extend the indication for operations for the radical cure of hernia to very young children and even infants, we still believe that a considerable number of children under the age of four years are cured by a properly applied truss. There is little risk from strangulation during this trial period of truss treatment. Our own statistics at the Hospital for Ruptured and Crippled do not show a single death from strangulation in infants or young children. On the other hand, the risk of operation during infancy is decidedly greater than in older children, as is shown by the statistics of Stiles and Carmichael. If a child has reached the age of from three to four years, and still has a hernia, we advise operation. In all children over the age of four years we no longer advise preliminary truss treatment, for the reason that the chances of a cure are smaller and the possibility of a relapse after a supposed cure from truss treatment greater.

Undescended Testis. At the Hospital for Ruptured and Crippled 123 operations have been performed for hernia associated with undescended testis, 26 of which were of the inguinosuperficial variety, the sac emerging from the external ring and passing upward to the anterior superior spine, resting on the aponeurosis of the external oblique. This condition, while regarded by previous writers as extremely rare, is, we believe, much more common than has been supposed. Moschcowitz states that only 17 cases have been recorded in the literature.

There has been no recurrence in any of our cases of hernia associated with undescended testis, although in a certain proportion the testis has retracted up to the region of the external ring, where it has remained and has not materially increased in size.

The ages of the children ranged between four and fourteen years; 54, or about one-half of the entire number, were over ten years of age. We seldom advise operation in these cases in children under the age of from eight to ten years. We do not consider it wise to operate at the age of two years, as advised by some of the French surgeons. In cases in which the testis cannot be palpated, operation had best be deferred until

a later time. We no longer advise suturing or fixation of the testis to the bottom of the scrotum, believing it possible in most cases, by freeing the cord sufficiently, to bring the testicle into the scrotum and where it will remain without suture. The method we have employed is very similar to that advocated by Bevan of Chicago. We do not transplant the cord in these cases, inasmuch as by not transplanting we gain from $\frac{1}{2}$ to $\frac{3}{4}$ inch in the length of the cord. In no case has castration been performed.

Final Results. Eight hundred and thirty-seven cases of inguinal hernia have been traced, and were found perfectly sound from one to fourteen years after operation. Of these, 2 were well upward of fourteen years; 3 were well from twelve to fourteen years; 20 were well from ten to twelve years; 59 were well from eight to ten years; 108 were well from six to eight years; 78 were well from five to six years; 70 were well from four to five years; 93 were well from three to four years; 170 were well from two to three years; 234 were well for one year.

The cases of femoral hernia were traced as follows: 4 cases were traced in which the patients had remained sound from eight to ten years; 3 cases were traced in which the patients had remained sound from six to eight years; 3 cases were traced in which the patients had remained sound from five to six years; 3 cases were traced in which the patients had remained sound from four to five years; 4 cases were traced in which the patients had remained sound from three to four years; 9 cases were traced in which the patients had remained sound from two to three years; 11 cases were traced in which the patients had remained sound from one to two years.

In 1978 cases of inguinal and femoral hernia there were 4 deaths, or about 0.2 per cent. In addition there has been 1 death following operation for incarcerated umbilical hernia, in a woman, aged fifty-six years, in December, 1906.

SURGERY OF THE ABDOMEN, EXCLUSIVE OF HERNIA.

By EDWARD MILTON FOOTE, M.D.

THE ABDOMEN IN GENERAL.

THE operations which can safely be performed upon the abdominal organs and the technique of their performance have been thoroughly discussed in the past few years. Not that all surgeons are agreed on all points, but the position of the prominent men is pretty well understood on most points, so that indications for operation and methods of resection or anastomosis no longer occupy the prominent place they once did. The attention of the surgical world is directed for the moment to questions of physiology, and in the abdomen there is an especial opportunity for a widespread study of innervation, circulation, absorption, peristalsis, and other normal processes, which are of vital interest to the operator; for if he can shape his work so as to aid these processes, or at least so as not to hinder them, success is clearly in sight.

Location of Abdominal Pain. Among the topics which offer an interesting field for study is that of the location of abdominal pain. The experimental work of Lennander,[1] of Sweden, has been more or less familiar to Americans from his published articles, and it was gratifying to have him present, at the last meeting of the American Medical Association, a paper upon this subject. His experiments, in which he has been joined by Ramström, seem to prove that sensations of pain within the abdominal cavity are transmitted by the phrenic nerve, the lower six intercostal nerves, and the lumbar and sacral nerves. These investigators believe that the entire parietal peritoneum is provided only with nerves of pain, and that the senses of cold, heat, and pressure are absent from it. The manipulations during operation which cause pain are those which occasion stretching of the parietal peritoneum as well as of the parietal attachments of the mesentery. For example, pain is occasioned by the placing or removal of gauze compresses between the viscera and the parietal peritoneum, by the dragging forward of the cecum, of the vermiform appendix, or of any other organ whose normal attachment to the abdominal wall is put on the stretch, and the same principle applies to the stretching of any abdominal adhesions which may connect the

---

[1] Journal of the American Medical Association, 1907, vol. xlix, p. 836.

viscera with the abdominal wall.   On the other hand, should a compress lie between the viscera without coming in contact with the abdominal wall, the patient experiences no sensation when it is removed.   Similarly no sensation attends the stretching or breaking up of adhesions which have no connection with the abdominal parietes.   As far as one can judge from these observations, the parietal peritoneum along the thoracic aperture and around the foramen of Winslow is especially sensitive to stretching, displacement, etc.

A slow and gradual stretching of all the layers of the abdominal wall by ascites or meteorism occasions distress rather than pain, although a high degree of meteorism may be attended by great discomfort.

Ulcerations and acute inflammations of the abdominal organs produce lymphangitis of the mesentery, and this greatly increases the sensitiveness of the cerebrospinal nerves to any manipulation.

In case of perforation or rupture of an abscess into the peritoneal cavity, pain is due to contact of the escaping fluid with the peritoneum and also to the increased contractions of the stomach and bowels, thereby produced.

Many clinical observations are explicable if one bears in mind the fact that only the parietal peritoneum can transmit painful sensations. For example, the primary pain occasioned by a duodenal perforation may be referred to the iliac fossa.   Again, the paroxysmal pains in connection with a gastric ulcer are elicited by the movements of the stomach, that is to say, by its dragging on a parietal serous membrane which is hyperesthetic on account of a lymphangitis from an infected ulcer. If the stomach is put at rest by the aid of a jejunostomy, the pains cease. Further, in the case of a patient with an inflammatory focus surrounded by small intestine and covered by a thick omentum, pressure on the abdomen will disclose no tenderness, whereas palpation per rectum may cause pain.

Lennander agrees thoroughly with Wilms' recently published statement that the pain of intestinal colic is wholly due to stretching of the mesentery.

Mitchell had an opportunity to test the correctness of Lennander's theories on two persons, one an intelligent white man and the other a negro.   Using only saline injection in the case of the white man, he found the different layers of the abdominal wall sensitive, but absolutely no sensation of pain when the omentum, transverse colon, and suspensory ligament of the liver were pinched or rubbed.   But when traction was made upon any of these structures, pain was at once complained of. The case of the negro was similar.   A large inguinal hernia was incised after a saline hypodermic injection.   The small intestine which was in the sac was pinched without any painful sensation.   An injection of cocaine was then made to permit the enlargement of the skin incision, and after this the appendix was clamped, divided, cauterized, and its stump

turned in with a purse-string suture, all without any pain being experienced. Traction upon the root of the appendix at any time caused pain, as did the ligation of its meson. This pain in both instances was referred to the umbilicus.

Meltzer does not accept absolutely the theories of some experimenters that there are no nerves of sensation leading from the viscera. He thinks that the absence of pain in some cases is due to shock. He calls attention to the inhibition of the visible peristalsis of the cecum of a rabbit by the mere opening of the abdomen. If a simple incision can stop peristalsis for a time, why can it not also stop the action of the nerves of feeling? Again, small does of cocaine may have an effect on sensation far beyond the locality in which the drug is injected.

Distention and Strangulation of the Intestine.—The presence of gas in the intestine is another subject which demands much study. It has generally been looked upon as an evil, but very little has been known of the manner of its occurrence. It is a conspicuous feature of ileus, but after all it may not be the cause of the suspended intestinal action. Indeed, it has even been suggested by one writer that the gas is nature's attempt to give the intestine something to contract upon, in the lack of any more tangible bolus. That overdistention of the intestine or stomach has a most injurious effect upon it, is shown by the experiments of van Zwalenburg.[1] He made use of loops of intestine of etherized dogs. Selecting a loop for the purpose, he passed an electric light bulb into one end of it, and a cannula into the other. He was then able to regulate the pressure within the loop, and to observe the bloodvessels under a microscope by means of the transmitted light. He found that at 60 mm. of mercury many small veins had their current arrested. At 90 mm. many blood streams were stopped, and some were flowing in abnormal directions, the blood seeking for a channel of lesser resistance by which it could reach the empty veins. At 130 mm. all circulation ceased, the corpuscles standing still in the bloodvessels, although showing the impulse of the heart beat by a slight to and fro motion. Intestine kept at 80 to 90 mm. of pressure for an hour was enormously congested, *i. e.*, the number of veins seen on the surface and their caliber were greatly increased. Effusion was so great that drops of fluid stood out on the surface like beads of perspiration. Minute ecchymoses were common.

The application of these observations in cases of appendicitis is evident. Behind a kink or constriction in an appendix fecal matter lodges, forming a ball valve; secretion back of this causes distention; this interferes with the circulation, causing congestion and effusion; the diminished blood supply lowers resistance, and infection easily takes place through the minute traumatisms and ecchymotic hemorrhages.

A similar sequence of changes takes place in strangulated hernia.

---

[1] Annals of Surgery, 1907, vol. xlvi, p. 780.

Obstruction at the ring retards venous circulation; congestion and effusion follow; they obstruct still more the circulation, and pressure increases until it is greater than the arterial pressure. Strangulation is then complete, and if not relieved in a few hours, gangrene develops from the germs in the intestinal lumen.

In the case of calculi lodged in the gall-bladder or common duct, the greater firmness of the walls of these structures will protect their bloodvessels from the pressure of distention for a longer time than in the case of the intestine. Moreover, the liver can take fluid from the bile ducts, and so keep down the internal biliary pressure. In various other conditions the effect of this internal pressure of hollow organs is well worth consideration. Indeed, the hydraulics of the human body are far too little understood.

Just what the relation of this increased internal pressure may be to acute dilatation of the stomach is not as yet clear. It must, however, be an important one when we consider that the great size of the stomach gives opportunity for an enormous hydrostatic pressure. Bloodgood,[1] in a recent review of this subject, calls attention to the great internal secretion which takes place in many of these cases. In some cases, although nothing has been given by mouth, liters of fluid have been removed by the stomach tube in the course of a few hours. What a disastrous effect the rapid accumulation of fluid may produce on the circulation of a large viscus whose orifices are temporarily occluded can easily be imagined.

The diagnosis of such *acute gastric dilatation* has already been spoken of in PROGRESSIVE MEDICINE (June, 1907, p. 86), and the importance of the prompt and repeated use of the stomach tube emphasized. The patient should also be put into various positions in the hope of relieving the pressure. If these measures fail, the abdomen should be opened (or reopened) at once.

A word of caution against overfeeding a patient after the application of a plaster jacket for kyphosis may be not out of place, since Neck[2] mentions four primary cases of acute dilatation of the stomach occurring under such circumstances.

Ileus, especially Postoperative Ileus. The subject of ileus is complicated, and writers upon it often fail to define their terms exactly. Thus, during the past year, of those who have written in America upon this subject, some have employed the term "dynamic" ileus to mean the forms of intestinal stasis not due to a mechanical obstruction, while others have used the term dynamic to indicate the mechanical cases, introducing the word "adynamic" ileus for the non-mechanical cases. When such a state of indefiniteness exists, it is well for every writer to

---

[1] Annals of Surgery, 1907, vol. xlvi, p. 736.
[2] Zentralb. f. Chirurgie, 1907, p. 58.

define his terms exactly before he goes on to give theories and treatment. In time a general understanding will be reached, and we shall have some term which is universally understood to mean a mechanical obstruction of the intestine, and another which shall mean merely a stagnation or stoppage of its current—intestinal stasis, as it were—due to the failure of the muscles to contract and propel the contents, although the lumen is open. As the matter stands now, ileus means a loss of function of the intestine. Like other parts of the body, the intestine suffers loss of function from local and general causes, from traumatism, from inflammation, from causes which act in a reflex manner, etc. Frequently reflex action and a mechanical cause co-exist, and this is the chief reason for the lack of clearness in the discussion of this whole subject. For example, in the loss of intestinal function following laparotomy, who can say how much of the effect is due to the peritoneal trauma direct, and how much to its reflex inhibitory effect? We know that there is such a reflex action, as it is sometimes shown after injury or operation upon other parts of the body than the abdomen. The same difficulty in determining the exact cause for the ileus exists in every case of peritonitis. Sometimes when the abdomen is opened the extent of peritonitis is so limited that it seems impossible that it could have had any direct effect in producing a cessation of the intestinal action, which must therefore have been due to a reflex action. Ultimately, when we know more about the whole subject of intestinal action and the things that favor and restrain it, we shall be able more intelligently to guard against unnecessary damage to its delicate mechanism. For the present the effort of the operator should be directed toward as little unnecessary manipulation as is consistent with the immediate operation in hand, and to as short an exposure of the abdominal cavity as may be.

Some of the terms which have been used for non-obstructive ileus are "pseudo-occlusion," "motor insufficiency," and "intestinal paralysis," although the condition is not one of paralysis, but rather of stasis. Koontz[1] points out that this form of ileus has hitherto received little mention in American medical literature. Following a suggestion made some years ago by Murphy, he calls it "adynamic" ileus, instead of dynamic. It is a symptom complex, combining in all cases four prominent symptoms: (1) Stoppage of the fecal stream; (2) meteorism; (3) abdominal pain; and (4) vomiting. Now, these are also symptoms of mechanical ileus. The chief points of difference lie in the history of the case. The mode of onset is always gradual, and, if not postoperative, it is the end of a long series of transitory attacks of ileus, associated with chronic constipation. It may usually be diagnosticated when it occurs in persons of high nervous tension without apparent cause, when it occurs after great mental strain or depression, or following some long-

---

[1] New York Medical Journal, 1907, vol. lxxxvi, p. 593.

continued peritoneal irritation, such as that due to cystic ovaries or splanchnoptosis, or when there is an incarcerated testicle or inflamed hydrocele, or profound shock following traumatism. It may follow an operation for piles or an operation on the mesentery, or any laparotomy in which the intestines have been carelessly handled; or if the small intestine instead of the sigmoid has been left in the pelvis at the close of operation. If there is a history of peritonitis, the diagnosis of adynamic ileus should not be made, on account of the frequency of mechanical obstruction after even a remote peritonitis.

Pain is not so acute as in mechanical ileus, meteorism develops earlier, while vomiting occurs late, or not at all. Auscultation reveals an absence of intestinal sounds.

In the early stages of adynamic ileus purgatives may be of value, although, usually, stimulating enemata are better. Abdominal massage, turpentine stupes, or a hot bath may also be employed. Dilatation of the rectum will sometimes start peristaltic action. *Physostigmine salicylate* is the most powerful drug we possess that can be used hypodermically to stimulate peristalsis. The specific treatment when simpler measures fail is enterostomy. The first loop of bowel which presents itself should be opened. If there is suspicion of mechanical obstruction, this should be sought for and relieved; otherwise, a short incision through the abdominal wall, made under cocaine, will suffice.

POSTOPERATIVE ILEUS. Martin[1] endeavors to distinguish postoperative ileus due to mechanical causes from the "dynamic" (non-mechanical) form of intestinal stasis, which passes off in a day or two with the resumption of function of the intestine, after a cathartic or enema. Severe abdominal pain, subsiding at times but recurring with great intensity, is the chief distinguishing feature of mechanical ileus. In the majority of cases it is referred to the umbilicus. There is usually not much change in the pulse and little or no rise in temperature. Later, vomiting becomes pronounced and persistent, and is accompanied by peritoneal shock. The leukocyte count is always high, thirty or forty thousand, and soon asymmetrical distention is noted and possibly visible peristalsis. When, however, the symptoms come on a day or two after operation, it is very difficult to say whether they are due to peritonitis or to mechanical obstruction, and, indeed, these two conditions are often associated. The stiffening of the abdominal muscles during palpation, the marked and universal spasm and rigidity noted in peritonitis, is less in amount in commencing mechanical obstruction, or, indeed, it may be altogether absent.

The prognosis depends not alone on an early operation, but in large measure on the nature of the case. If the extent of abraded or inflamed surface at the original operation was extensive, it will be difficult to greatly

---

[1] Journal of the American Medical Association, 1907, vol. xlix, p. 1006.

improve matters by a second operation. It is well to be on guard against the possibility of postoperative ileus. Martin always washes out the stomach in such cases, gives absolutely nothing by mouth, and saline by rectum. If, then, acute abdominal pain, persistent vomiting, and high leukocytosis develop, with no passage of gas or feces, and the seat of pain is very tender, and there is peritoneal shock or depression, operation is promptly performed. If the obstruction can be found it is removed. At a later stage, if the obstruction cannot be found without too much manipulation, an enterostomy should be performed and the small intestine emptied of its contents. When this is done there is often a sudden change from great suffering to comparative relief; a cessation of pain and vomiting, and a disappearance of shock. In his series of eight cases of postoperative ileus occurring before the patient left the hospital, the earliest attack was noted on the fourth day, and the latest on the twenty-third day.

Munro,[1] in speaking of the subject of ileus, as seen both before and after abdominal operations, says that the general practitioner should rid himself of the idea that it may be caused by functional disturbances, hysteria, drugs, etc. He should search first for septic, traumatic, or mechanical causes, then for reflex causes, and lastly for functional causes. Dynamic (non-mechanical) ileus is almost always the result of sepsis of the peritoneum or of toxins affecting the motor mechanism of the intestine. In cases in which the toxin is of extra-abdominal origin, for example, in pneumonia or nephritis, there is wanting a sign which exists in peritonitic cases, namely, muscular spasm. In the peritonitic type of ileus, marked by the presence of surgical spasm, elevated pulse and temperature, and leukocytosis, it is a grievous error to attempt forcible passage of flatus or feces by the repeated administration of cathartics. If the case is a mild one it is safe to rely on the administration of enemas, irrigation of the stomach and colon, and the administration of saline by rectum to aid the elimination of toxins through the kidneys. The rectal tube should be inserted for the passage of gas, and antispasmodics may be given. Operation may at any time become necessary, but this will be to remove the cause of the ileus if it is a mechanical or a local inflammatory one; rarely will it be necessary in the case of non-mechanical ileus.

For six years, in cases in which complete intestinal rest is not likely to be necessary, Craig[2] has given the patient before operation a hypodermic injection of sulphate of atropin; and before the peritoneal cavity is closed he injects, hypodermically, $\frac{1}{40}$ grain of freshly prepared solution of eserine salicylate. This prophylactic dose seldom needs repetition. He cites cases to show that this drug, even when it is administered after symptoms of postoperative ileus are well established, is capable of stimu-

---

[1] Journal of the American Medical Association, 1907, vol. xlix, p. 901.
[2] Ibid., p. 1266.

lating peristalsis, so that a patient will expel great quantities of flatus within half an hour.

HOT AIR TO PREVENT ILEUS. While physostigmine has proved a powerful agent to excite peristaltic action in cases of threatened dynamic (non-mechanical) ileus, its poisonous qualities limit its use, especially with younger patients. A method of treatment which exerts a powerful action upon peristalsis without the risk of poison is the daily application of dry, hot air to the abdomen, as suggested by Bier Gelinsky[1] has had remarkable results with this treatment, which he has employed for a year. He places his patients on the very day of operation, and each day thereafter, in a hot-air cabinet, with a temperature of 120° to 150° C. (250° to 300° F.), and keeps them there twenty minutes. There follows almost immediately a discharge of gas per rectum. Patients are not inconvenienced by treatment; on the contrary, they feel very well. In 13 aseptic laparotomies the single treatment in the hot-air chamber was sufficient to set peristalsis in action and to prevent intestinal stasis, which is so annoying even after exploratory laparotomy. In one case of resection of the sigmoid, with end-to-end anastomosis, gas was passed on the first day, and formed stools from the second day on. Postoperative ileus was avoided in 11 cases of perforative appendicitis. In only 2 cases were there signs of subsequent chronic adhesive peritonitis, and these entirely disappeared in from three to six weeks, during which time the hot-air treatment was administered from two to four times. One man with extensive peritonitis, who was admitted in a very bad condition, died forty-eight hours after operation. Even in his case the hot-air treatment produced a free discharge of gas. The impressions given to the observer were that the power of the peritoneum to withstand infection was increased by the hot-air treatment, which also seemed to put an end to lesser forms of infection.

A somewhat contrary opinion is held by Danielsen.[2] He believes that in some cases the hot-air treatment, by increasing the circulation and also the flow of lymph, may do the patient much harm. He believes that the hot air will exert a favorable action by increasing the resorption of infectious material of a slight degree of virulence. This is the case with a strong patient in good general condition, with a moist tongue. On the other hand, if the patient has a feeble pulse of 120 or more, and a dry, coated tongue, and is in bad general condition, he is probably struggling with a virulent infection. Under such circumstances, Danielsen thinks the resorption should be delayed by the application of ice. He, too, falls back upon considerable clinical experience in the demonstration of the correctness of his theories.

ENTEROSTOMY FOR ILEUS. In acute intestinal obstruction it does not suffice to remove the obstruction to peristaltic action; it is equally,

---

[1] Zentralb. f. Chir., 1908, p. 1.   [2] Ibid., p. 121.

perhaps more, important in many cases to empty the proximal portion of the intestine in order to avoid a toxemia.

In doing this there is great risk of soiling the field of operation. Furthermore, the evacuation is likely to be incomplete. A bit of technique suggested by Moynihan[1] is as follows: He makes use of a large glass tube which he introduces through a small incision in a distended intestinal coil. The tube is eight or nine inches long, and as the intestine is emptied, more and more of it is drawn over the tube, and in this way from six to seven feet of small intestine can be thoroughly emptied. Escape of intestinal contents is prevented by an elastic ligature, and the fecal stream is conducted away from the field of operation by a large rubber tube.

Monks[2] followed enterostomy for peritonitis by flushing the intestinal canal. He made two openings, one as high up as possible, and the other low down in the exposed portion of small intestine, and washed through from one into the other, and then from the lower one into the colon. Both these wounds were closed, and the peritoneal cavity was irrigated and drained. After the abdominal dressing was in place, a tube was introduced into the rectum, and about one and one-half quarts of intestinal contents and salt solution were drained away. The patient was a child, aged eight years, whose streptococcus peritonitis was of unknown origin. During the flushing the pulse fell from 180 to 140, and improved in character. The patient suffered from vomiting for three days, but otherwise made a good recovery.

Monks is convinced that the flushing was an important factor in the recovery of this patient from general peritonitis.

The removal of a large amount of liquid feces and gas from the lower part of the small intestine and the colon must have greatly diminished the absorption of septic products, while the introduction of a large quantity of warm salt solution must have rapidly increased the amount of fluid in the vascular system and favorably influenced the body temperature.

RESECTION FOR ILEUS. Mayo[3] says that when resection of intestine for the relief of ileus becomes necessary, it is not on account of obstruction of the intestinal lumen in most cases, but because of the damage to the blood supply. This follows the distention of the intestine, and when the blood supply is damaged, the intestinal walls are no longer able to oppose the passage of virulent bacteria into the peritoneal cavity, and septic peritonitis is the result. At the time of operation the intestine at the point of obstruction and for some distance above it is filled with material which contains millions of bacteria and also a great quantity of toxins. Hence the necessity of removing this material and not allowing it to flow down

---

[1] Archives Internationales de Chirurgie, 1906, vol. iii, p. 59.

[2] Boston Medical and Surgical Journal, 1907, vol. clvi, p. 809.

[3] Journal of the American Medical Association, 1907, vol. xlviii, p. 903.

into the comparatively healthy intestine below the point of obstruction. Evacuation of this material is best accomplished by the method of slipping the intestine over a large tube and washing it out.   Treves says that the mortality following resection of the intestine for obstruction has decreased one-half since the emptying of the intestine has become a common practice.   While it is desirable to avoid unnecessary handling of the damaged intestine, this removal of contents and dilution of what remains should extend high up, and should usually be combined with gastric lavage and rectal irrigation either before or after the operation.   Mayo favors lateral anastomosis of the small intestine for acute obstruction necessitating resection; end-to-end anastomosis for chronic obstruction.

Operations for Peritonitis.   The present tendency in operations for peritonitis is to strive to restore the function of the intestine as promptly as possible.   To this end various measures which are likely to increase or prolong the paralysis of the bowel have become less and less popular. Evisceration is now almost universally condemned, and some operators are much opposed to drainage for the same reason.   Even irrigation of the peritoneal cavity, or the introduction into it of large quantities of saline solution to make good the fluid loss of the body, is now viewed with a good deal of suspicion.   Advocates of irrigation sometimes suggest that it should be confined to the infected peritoneum—a precaution which is often followed with difficulty if one irrigates at all.   One has no right to irrigate healthy peritoneal surfaces with normal saline solution until it is shown that such irrigation produces a leukocytosis which protects the patient against the risk of infection.

It has been estimated that an adult requires for use in his body during the twenty-four hours following an operation for peritonitis at least two quarts of fluid.   Four or five times this amount can often be utilized if introduced slowly.   If the fluid can be introduced through the rectum or through an oblique fistula in the cecum, the effect is better than when it is injected subcutaneously or into a vein.   In desperate cases of threatened paralysis, one should not hesitate to inject from one to two liters of artificial serum into a vein once or twice in twenty-four hours.

After every operation for suppurative peritonitis there is a risk of adhesions and kinking of the intestines, and for this reason it is better not to administer even fluids in too great quantities by mouth, lest the intestine have difficulty in handling it.   There may result stagnation and dilatation.

The object of an operation for diffuse peritonitis is to remove the source of infection and free the abdominal cavity from pus, fecal matter, etc., and to provide for the further escape of secretions by means of drains. Such, at least, are the generally accepted principles of an operation of this character.   Every one admits the advantage of exact and rapid operative technique, the closure of the perforation, or the removal of the perforated organ, but there is still no unanimity of opinion as to

the best method of treating the paralyzed intestine. Enterotomy, enterostomy, resection of the intestine, gastrostomy, and emptying the intestine by milking are methods whose advantages and disadvantages have been freely presented by their friends and enemies. Among German surgeons, Hirschel[1] has written in favor of milking the intestine after enterotomy, although all the patients upon whom he tried this failed to recover. He also advocates enterostomy, which he employed nine times with two successes. A rubber tube left in position was used to wash out the small intestine. Heidenhain, Lennander, Dahlgren, and others take essentially the same stand.

Opinion in Germany differs as to the value of irrigation just as it does in America. Hirschel advocates it when the peritoneum is filled with an exudate, as it often is after perforation of the stomach or intestine, or in case of gangrenous peritonitis following perforation of the appendix; whereas, he would omit it in cases in which the peritonitis is limited in area, as well as in those cases in which the exudate is serous or sero-purulent only. In his clinic, when irrigation was not employed, the exudate was generally sponged out. Reichel, Gluck, Brunner, and others advocate the use of antiseptics in irrigation, but a still larger number rely upon the mechanical action of a great quantity of saline solution. Only a few among the Germans are opposed to irritation in any form.

A method of treatment which is the direct outcome of experiments upon animals is the use of *camphor oil* in the peritoneal cavity. Glimm found that oil blocks up the lymph channels of the peritoneum, and so delays the resorption of bacteria and toxins. He found that rabbits so treated could withstand an amount of peritonitis which was certain death to rabbits upon whom no oil was used. He recommended for use in the human peritoneum sterile oil containing one per cent. of camphor. Hirschel has followed this in three cases, and believes that he could detect in every instance a good result, although he succeeded in saving the life of only one of these three patients. The oil is applied especially to the surface of the diaphragm by means of a long-handled swab, about an ounce being used.

On the Spread of Infection from the Abdomen. The amount of absorption through the peritoneum in health and in the presence of inflammation is another question upon which surgeons would welcome much more light than they now possess. One hears little nowadays of the reversed incline after laparotomy, while the elevation of the shoulders and chest well above the hips is a position that seems to be growing in favor. If one's sensations are any guide, and they usually prove in the end to be a most reliable guide, the position of greatest comfort is the best position for recovery. Meanwhile there is still much uncertainty about the relative importance of absorption from the peritoneum and that

---

[1] Beiträge zur klin. Chir., 1907, vol. lxi, p. 263.

from the intestine. The experiments of Goebel[1] while undertaken to explain particularly the occurrence of pneumonia following operations upon the stomach and intestines, have also a value in explaining the probable course taken by many bacteria after severe abdominal injury, and possibly after operations upon other organs than the stomach and intestine; for even though the lumina of these be not opened, the intraperitoneal disturbance must in many cases lessen the natural barriers to the escape of bacteria from within the alimentary canal.

Goebel has shown by his experimental work that microörganisms introduced into the lymph spaces of the intestine of the guinea-pig find their way into the lungs, and also into other organs of the body, in from one to twenty-four hours. While it has not been absolutely proved, it is probable that they pass through the lymphatics of the mesentery and the thoracic duct. The lymphatic glands through which they have to pass present no great obstacle. Doubtless some bacteria are caught by them. Others pass through or around them by means of collateral lymph channels.

This seems a more likely explanation of the entrance of bacteria into the circulation than that they are taken up by the peritoneum itself; and the same holds true apparently for human beings as well as animals. While many of the germs which are brought into relation with lymph spaces by an operation upon the stomach or intestine are killed by the antibacterial forces of the body, the more resistant ones are able to maintain their vitality while passing the lymphatics above mentioned, and so reach the lungs. If the conditions for their further growth are then favorable, pneumonia may result. What the conditions are which favor this growth is well known. A poor circulation, due to weakness of the heart or alcoholism or cachexia, chilling of the patient during operation, too strong anesthetics, a preëxisting bronchitis, etc., may determine whether the bacteria which have reached the lungs shall multiply there or succumb to the antibacterial fluids of the body. The importance of not lessening resistance in operations upon the stomach and intestines cannot be too strongly emphasized.

Abdominal Drainage. Closely associated with the question of absorption from the abdomen, is the question of abdominal drainage. This is by no means wholly or chiefly one of gravity, for so many other factors enter into it; and yet gravity must play some part, especially in those cases in which there is a large collection of fluid; and at least we ought to know where the most dependent portions of the peritoneal cavity are situated. To this end the illustrations in connection with Coffey's[2] article are most interesting. He reviews, and in part repeats,

---

[1] Mitteilungen aus der Grenzgebieten der Medizin und Chirurgie, 1907, vol. xviii, p. 49.

[2] Journal of the American Medical Association, 1907, vol. xlviii, p. 937 .

the work of Clark and Yates. In addition he has made a number of experiments and clinical observations, which seem to show that gauze drainage, to be successful in the peritoneal cavity, must be employed in certain definite ways. He found that the drain causes a flow of serum which is profuse wherever the drain touches the peritoneum. This serum dissolves blood clots and dilutes thick pus so that they are able to escape through the meshes of the drain. The amount of drainage at the surface of
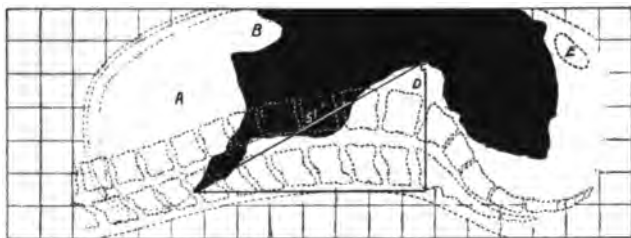
Fig. 28.—Diagonal section through pelvis and right flank at base of appendix (shown by black space): *A*, liver; *B*, gall-bladder; *C*, appendix; *D*, psoas muscle; *E*, pubic bone. (Coffey.)

the body is in proportion to the amount of drainage material at the surface of the wound. Therefore the size of the drain at the outlet should never be less than that of the drain in the deeper portions of the wound. When this rule is observed collections of blood or pus are never found in the vicinity of the drain after forty-eight hours. A small gauze drain is likely to be choked at the exit. A large gauze drain is not affected in this manner, but after it becomes saturated with fluid drainage prac-
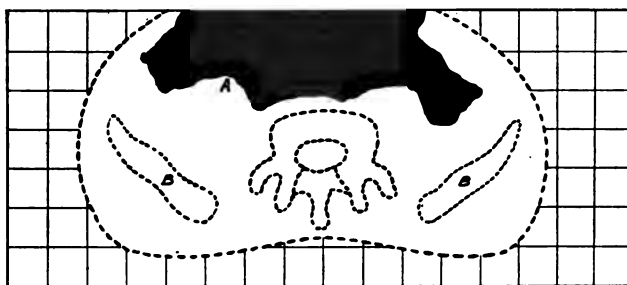
Fig. 29.—Cross-section at base of appendix (shown by black space): *A*, appendix; *B*, ileum. (Coffey.)

tically ceases, unless the outer end of the drain is in contact with dressings or is lower than the depth of the cavity drained.

Coffey also found that gauze drainage is of little value within a walled abscess cavity. It does not excite a flow of serum in such a cavity, and hence the blood and pus is not sufficiently liquefied to be soaked up by the gauze drain. Tubular drainage is better for a walled cavity, but tubes will not drain up hill except when the fluid is confined.

With reference to postural drainage, Coffey's experiments show that when a subject is lying perfectly flat on its back both flanks are lower than the pelvis (Fig. 28). If one wishes to elevate the shoulders above the pelvis, so that the fluid will run from the flanks to the pelvis, this

FIG. 30.—*A*, successful drainage of right flank; *B*, postoperative abscess in left flank; *C*, tip of gall-bladder. (Coffey.)
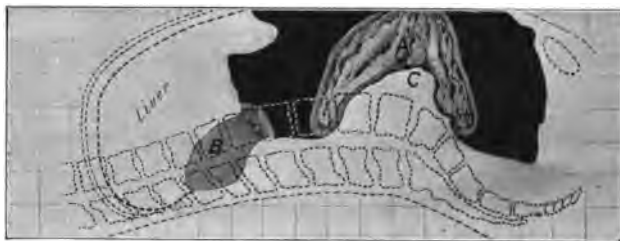
FIG. 31.—*A*, appendical abscess successfully drained: *B*, separate retrohepatic abscess found postmortem; *C*, appendix. (Coffey.)
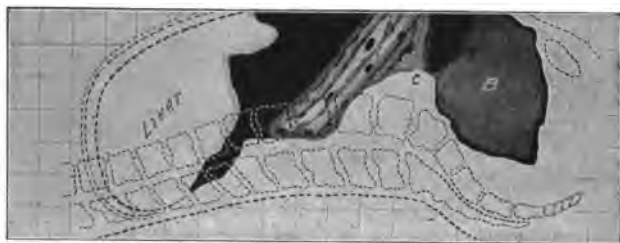
FIG. 32.—*A*, appendical abscess successfully drained: *B*, separate abscess discovered six days later; *C*, appendix. (Coffey.)

elevation must be carried to an angle of 60 or 70 degrees. The ordinary method of applying the so-called Fowler position is to raise the body to an angle of less than 30 degrees. A far simpler method of postural drainage is to turn the body on its side. In this way both flanks and the pelvis can be drained.

Fig. 29 shows that the left lumbar region is lower than the appendix. Figs. 30, 31, and 32 are diagrammatic illustrations from actual cases showing how abscesses may form in the most dependent spaces when not drained.

The disadvantages of draining through a large operative wound when there are septic products to be gotten rid of are very great, since there is the possibility of infecting the whole wound. In case of abdominal wounds this may be a factor in the production of ventral hernia. Therefore Rastouil[1] adopts the plan of making a second wound just large enough for the drain and closing the operative wound completely by sutures. Intermuscular separation or muscle splitting is employed in making the wound for drainage. In suitable cases one may utilize the vagina for drainage, and close the abdominal operative wound completely.

The Cause of Death after Laparotomy. This question is of interest to surgeons, particularly in cases in which the obvious causes of death, such as hemorrhage and infection, have been avoided. When a patient dies under such circumstances, he wishes to know whether the operation has hastened death, or whether it would have occurred without the operation; whether the choice of a different anesthetic, or a different method of operating, or a different after-treatment would have avoided the fatal termination. Such questions can only be decided by postmortem examinations, since the clinical evidence almost always points to a gradual failure of the heart, and frequently does not reveal the true cause of this termination. Oestereich, in his *General Pathology*, says that the immediate cause of death is always to be looked for (1) in the failure of the heart, (2) the respiratory tract, or (3) a part of the nervous system, especially of the medulla oblongata. As soon as the function of one of these parts ceases, even for a short time, life is ended; whereas, the function of the liver or kidneys, for example, may be suspended for hours without causing death. With this idea in mind, Selberg[2] has carefully examined the records of one hundred autopsies made after laparotomy. After excluding the cases of peritonitis, ileus, necrosis of the pancreas, etc., there remained some 17 cases in which the cause of death was due to failure of the function of the heart or lungs. In 3 cases the heart was paralyzed by an excess of chloroform. In 5 other cases of aseptic laparotomy, failure of the heart was the direct cause of death; in 6 others the lungs were responsible, and were found either edematous or the seat of pneumonia. There were 3 cases of embolism of the pulmonary arteries; the thrombus from which the embolus came was situated once in the right epigastric vein, once in the left iliac vein, and once in the right femoral vein. This high percentage of embolism,

[1] Revue de Chirurgie, 1907, vol. xxxvi, p. 597
[2] Beit. z. klin. Chir., 1907, vol. lv.

3 per cent. of all cases, shows how important a part thrombosis and embolism play—far more important than is generally recognized. Considerable has been written about the patients with thrombosis who recover, but little has been said of this as a possible cause of death following laparotomy.

Unquestionably a great many cases of death have been ascribed to shock, in which a carefully performed autopsy would have shown the presence of embolism, or fat embolism, or air embolism, or injury of the brain or the intestinal tract, or the pancreas, or the liver, or other gross lesions. It is therefore a wise plan to adopt the definition of shock given by Georgii, who says that genuine shock should only be considered the full cause of death in those cases in which death has occurred within two hours after an injury, and in which a postmortem examination, including a microscopic examination, reveals no other sufficient cause of death. In Selberg's list of cases there was none in which death could be ascribed to shock in accordance with the above limitations.

The rapidity with which death follows laparotomy varies according to its cause. In cases of paralysis of the heart, it usually follows operation in less than twenty-four hours, and is delayed for six days or more when it is due to pulmonary conditions. In the 3 fatal cases of embolism referred to above death occurred in five or six days.

Oxygen in Abdominal Surgery. The good results which an exploratory laparotomy often has upon a patient suffering from tuberculous peritonitis, have been attributed to a number of factors—irritation of the peritoneum, removal of the ascitic fluid, the congestion following a laparotomy, contact with the air, the effect of light, etc. Hirschfelder suggested that the oxygen in the air formed in the peritoneal cavity an oxytuberculin that arrested the further development of the tubercle bacilli. Schmidt[1] first called attention to the fact that a single injection of pure oxygen into the peritoneal cavity will stop the bacterial growth in many cases. Recently a number of surgeons have tested this fact.

By experiments upon animals Bainbridge[2] has found that oxygen injected into the peritoneal cavity not only produces no shock, but is a very powerful stimulant, lessening the shock of the anesthetic and hastening the recovery. The same effects are noticed in man, so that one need have no hesitation in employing it. The gas is warmed by passing it through a hot-water bottle, or by allowing the tube which conducts it to lie in a basin of hot water. Thus introduced into an abdomen, until moderate distention occurs, about two or three days are required for the resorption of the gas. A number of cases are cited to show its beneficial action in overcoming shock and in producing a feeling of comfort after laparotomy, due perhaps to the mechanical .

---

[1] Deutsch. Archiv. klin. Med., 1905, vol. lxxxv, p. 109.
[2] New York State Journal of Medicine, 1908.

separation; of intestinal coils. He has also employed it in 3 cases of *tuberculous peritonitis* with two cures, 1 of nine months' duration and the other of nearly four years.

Bainbridge's plan is to insert a soft rubber tube just before the closure of the peritoneum, and to prevent leakage of the gas by purse-string suture around the tube. Deep and superficial interrupted sutures are next inserted and tied. The gas is then allowed to flow, and when the abdomen is sufficiently distended, the tube is withdrawn and the purse-string suture tied.

From conditions observed on reopening the abdomen, both in man and animals, this writer has been lead to believe that oxygen tends to prevent the formation of adhesions between abraded or inflamed serous surfaces. . The comfort following laparotomy when oxygen is employed may be explained in this manner.

Schulze[1] reports 7 cases in which he has injected oxygen with success for the cure of tuberculous peritonitis. Unfortunately, his diagnosis was in each case only a clinical one, not confirmed by bacteriological tests. In 5 cases only a single injection was employed; in the other 2 cases a second injection was made, on account of the re-accumulation of fluid. All of the patients remained free from fluid up to the time of observation, and that was more than eighteen months in 6 of the cases. Schulze's method was extremely simple. He inserted a trocar, withdrew the fluid through a cannula, and injected oxygen washed and sterilized by passage through bichloride solution. The amount was not measured, but enough was injected to distend the abdomen to about the size that it had before the fluid was withdrawn. Free gas was usually demonstrable by percussion for eight or ten days; in 1 case for three weeks. One patient had a rise in temperature of two or three degrees for several days. About half of the patients complained of pain or nausea or vomiting for a short time after the injection. Otherwise there were no symptoms to be noted.

These reports are certainly encouraging, and the method deserves further trial. Most surgeons will prefer to open the abdomen by a short incision, and not to trust to aspiration for the removal of the fluid. This will enable them to remove any local tuberculous lesion in appendix or Fallopian tube, and they will also avoid thereby the risk of puncturing the intestine. The danger of this procedure has recently been impressed upon my mind by witnessing a fatal peritonitis following about the fourth puncture made by a physician to empty an ascitic abdomen in tuberculous peritonitis. He had the misfortune to puncture the abdominal wall at the exact point where the small intestine was adherent, probably as the result of a previous puncture, although this could not be definitely proved.

[1] Mitt. a. d. Grenzgeb. d. Med. und Chir., 1907, vol. xviii, p. 150.

It may be suggested, in criticism of this use of oxygen, that the same patients might have recovered following a simple laparotomy. It will require a longer time and a greater number of patients to establish this positively, but the percentage of permanent cures following simple laparotomy is not as large as many suppose, and is certainly not as large as the published reports of operators would indicate.

This is not due to any misrepresentation on their part, but merely to the fact that many of the patients have been operated upon only a short time previous to the date of report. There will, therefore, be not a few recurrences among the cases classed as cures. It is necessary to observe a patient for at least a year following an operation of this sort before concluding that his ascites and other symptoms have permanently disappeared. Hemmeter[1] has been able to trace twenty patients from his own experience, and finds that a little over one-third of them suffered no relapse for at least a year following operation. He was similarly able to trace 49 patients who were treated medically. Here, again, the percentage of cures was almost exactly one-third; some of them, however, had gone for two or three years without recurrence of their symptoms. As few surgeons who have reported long series of cases have claimed more than 50 per cent. of cures, the results of Hemmeter's investigation are not contradictory in accordance with the possible difference explained above. The interesting thing is the fact that the percentage of cures with and without operation is almost exactly the same. In most cases the writer does not state what the nature of the operation was, excepting that it was a laparotomy.

Disinfection of the Skin before a Laparotomy. Von Brunn[2] has conducted an elaborate series of tests in order to determine the best method of treating the skin of a patient previous to operation, comparing the results of the usual methods of skin sterilization by mechanical and chemical means, with results obtained by coating the skin with a solution of rubber or some other impervious material. This comparison can best be shown in tabular form:

No. of tests.	Method of disinfection.	Average number of germs in culture test from			
		operative field before operation.	wound after skin incision.	wound at end of operation.	suture line.
5	Führbringer	12 or more.	2–3	Many	Great many
3	Heusner	11 or more	7	29	Many
10	Döderlein	1	2	9 or more	11–12
3	Fürbringer and Döderlein	1	1	13 or more	Many
15	Heusner and Döderlein .	5–6	9–10	4 (5 cases only)	5 or more

[1] Medical Record, 1907, vol. lxxii, p. 801.
[2] Beit. z. klin. Chir, 1907, vol. liv, p. 630.

The patient was shaved and bathed with soap and water in all cases. The following technique was then employed upon the operative area:

Führbringer's Method. Washed with soap and water; dried, rubbed with a compress saturated with alcohol and ether, equal parts; rubbed with a compress saturated with 2 per cent. lysol solution and covered with the same until operation.

Heusner's Method. Rubbed for five or ten minutes with a compress saturated with benzine containing 10 per cent. of paraffin oil and 0.1 per cent. of iodine.

Döderlein's Method. Painted with tincture of iodine; painted with gaudanin, a solution of rubber in benzine containing 1 per cent. of formalin to render it antiseptic. When the skin was dry it was dusted with sterile talcum powder and covered with a sterile towel. Just before the incision the excess of powder was wiped off with gauze.

Führbringer's and Döderlein's Method. A combination of the two, with omission of the painting with iodine.

Heusner and Döderlein's Method. After the Heusner treatment, the skin was rubbed with benzine to remove the oil, and the rubber solution applied. The painting with tincture of iodine was omitted.

In addition to these tests made in laparotomies, von Brunn made nearly two hundred tests in operations for goiter, for hernia, and upon the breast. The relative results were the same.

Bacteriologically, therefore, the method of Döderlein is far superior to the others. It has, however, the disadvantage of being irritating to the skin in many instances. It is especially so when a drain is employed, so that its use under such circumstances is not recommended. Of the two scrubbing methods, that of Heusner is preferred. It yielded somewhat better results, and is much simpler and quicker than Führbringer's. The presence of 10 per cent. of paraffin oil prevents irritation of the skin.

Transverse Abdominal Incisions.—Maylard's[1] attention was called to the subject of transverse incisions some eight years ago by the necessity of reopening an abdominal wound having both a transverse and a median incision. The scar of the former was so much firmer than that of the latter that he was led to make transverse incisions intentionally. Longitudinal incisions are likely to be followed by hernia in a certain number of cases. Moreover, in many instances, a better exposure is obtained by a transverse incision. This is true in operations upon the stomach, as well as in operations upon the pelvic viscera. A median incision is usually bloodless, and can, therefore, be more quickly made and more quickly closed than a transverse or oblique incision. For these reasons it is preferable in cases of acute intestinal obstruction, intestinal perforation, advanced malignant disease, and other conditions in which rapidity of operation is imperative. If the incision becomes infected, so

---

[1] British Medical Journal, 1907, vol. ii, p. 895.

that it must heal by granulation, a hernia will almost certainly develop provided the incision is a median one; whereas, it is the exception to find a hernia following even an infected transverse incision. One reason for this is the abundant vascular and lymphatic supply in the edges of the wound. In support of his position, Maylard gives the condition of the transverse abdominal scars below the umbilicus in sixteen patients operated upon by him at least eighteen months previously. In 6 cases the sheaths of the recti muscles were divided, but the muscles themselves were not divided, being merely drawn to one side. The resulting scars in 6 of these patients were absolutely sound. In 3 of
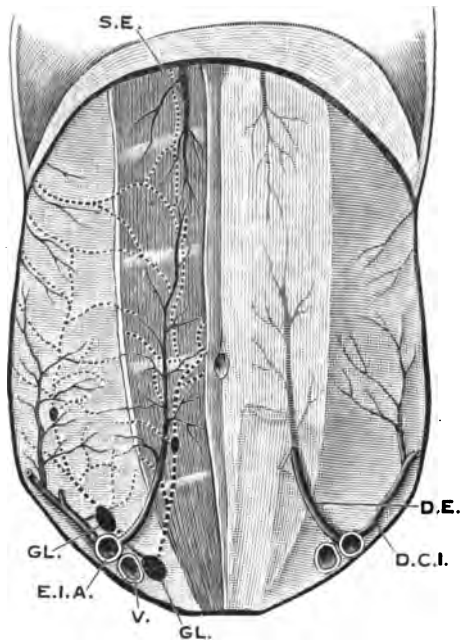
Fig. 33.—Bloodvessels and lymphatics of the anterior abdominal parietes. *E.I.A.*, external iliac artery; *V.*, vein; *D.E.*, deep epigastric artery; *D.C.I.*, deep circumflex iliac artery; *S.E.*, superior epigastric artery; *G.L.*, lymphatic glands. (Macphail.)

the remaining cases there was no bulging through the divided recti muscles, but only in the median line. In the other patients there was a general hernial protrusion through the whole scar, due possibly to the fact that the patient was obliged to do heavy lifting soon after her operation.

The bloodvessels and lymphatics of the anterior abdominal wall, in so far as they relate to abdominal incisions, are shown in the accompanying illustration (Fig. 33).

In dividing the sheath of the rectus, the chief end to be aimed at is to carry the incision as much as possible in the line of the fibers of the

aponeurosis. In the upper part of the abdomen, up to a distance of two inches from the xiphoid, an incision should be carried obliquely downward and outward; while in the lower part of the abdomen the ends of an incision should be carried obliquely upward and outward. In the central part of the abdomen an incision should be transverse (Fig. 34).

If sufficient room can be obtained without division of the recti muscles, such division should be avoided. When the rectus is divided, the incision should be an oblique one, and the outer fibers should be left intact. Serial suturing is advisable, and patients should remain in the dorsal or semirecumbent position for four weeks following operation; or if the wound heals by granulation, six weeks or two months should be allowed for complete rest in the dorsal position, according to Maylard.
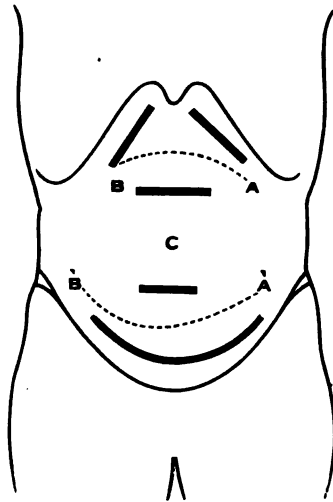
Fig. 34.—Diagram of oblique transverse and curvilinear abdominal incisions. Above and below the dotted lines (*B A, B′ A′*), the incisions are curved or oblique; between these lines they are transverse.

Should experience show that this long dorsal incubitus is essential to a firm union, it will do much to counterbalance the advantages of transverse incisions, since the debilitating effect of such long bed treatment should be avoided as much as possible.

The subject of transverse skin incisions has already been spoken of.[1] The cosmetic advantages of short transverse skin incisions are very great, even if the aponeurotic incision be longitudinal; but if a long incision is required through the aponeurosis, it is necessary to dissect the skin and fat for a considerable distance in order to expose sufficiently the deep fascia. This unquestionably predisposes somewhat to a mural abscess, an account of the slight power of resistance in these planes of tissue.

[1] PROGRESSIVE MEDICINE, June, 1906, p. 55.

If the deeper incision is not to exceed two or three inches in length, it is not at all necessary that the incision through the skin should conform in direction to the deeper incision.   The skin may therefore be incised in the line of a wrinkle or within the hairy suprapubic area, as the case may be.   The nice details of wound closing are too often forgotten. How many times we see an abdomen needlessly scarred by the marks of heavy sutures, left in place unnecessarily long, when fewer and finer stitches would have answered equally well, or cross-scars which might have been altogether avoided by an intracuticular skin suture, all other sutures being buried!

THE STOMACH.

Perforative Gastric Ulcer. It is a familiar fact that when attention is directed to a certain lesion, the number of observed cases greatly increases. This is, of course, due to the improvement in diagnosis, and not to an actual increase in the disease. A curious and interesting increase in the number of cases of perforated gastric ulcer occurring in hospital practice is attributed by Martens[1] to the growing habit of sending promptly to a hospital patients with appendicitis. Included among these are a number who have a perforated gastric ulcer. To appreciate how great is this difference, one needs only to consider two facts: First, in the years from 1857 to 1885, among the tens of thousands of autopsies performed at the Charité in Berlin, there were only 25 deaths due to a perforated gastric ulcer, less than one a year. The patients with acute abdominal lesions remained at home to die. The second fact is this: In a little more than three years past, Martens has seen in a single hospital 11 cases of perforated gastric ulcer and 2 of perforated duodenal ulcer. Almost without exception these patients entered with the diagnosis of appendicitis. Twelve of these patients were operated upon; 6 recovered and 6 died. One was moribund and died in an hour after admission without operation.

This error in diagnosis, while it did not delay operation, is to be deplored. The symptom-complex which follows gastric perforation is sufficiently distinct to enable a physician of ordinary intelligence to say definitely in most cases that a perforation has taken place, even if he can not be sure that the perforation is in the stomach. If one follows the practice of immediate operation in acute abdominal lesions, little harm will follow a mistaken diagnosis of appendicitis. He who delays operation to give cathartics an opportunity to work may have the unfortunate experience later of finding the cathartics in the peritoneal cavity, which all will admit is a hindrance to recovery.

Martens' technique is commendable in its simplicity. He combats

[1] Deut. med. Woch., 1907, p. 1851.

existing shock by saline infusions and rectal injections of coffee, drains the full stomach with a tube, but does not irrigate it, and usually operates under lumbar anesthesia, with local infiltration anesthesia (Schleich) The perforated ulcer when found is closed by simple enfolding and suture. Korte formerly excised the ulcer; now he merely freshens its edges. Martens' practice is the safer and quicker one. Sometimes excision leaves a fearfully large hole to be sutured, and sutures hold badly in the inflamed tissue. Martens covers the suture line with omentum, and then leaves in place a small tube covered with gauze. This is a questionable practice in most cases. He wipes away extravasated gastric contents, and only irrigates in the presence of a wide-spread peritonitis.

Shall one combine suture of the ulcer with gastro-enterostomy? Probably most surgeons will say "No" to this question, provided the ulcer is not so situated that its suture unduly narrows the pylorus. Korte says "Yes," and cites 9 cases in which he so operated with only 2 deaths. He does not favor drainage. Von Eiselsberg sutured the ulcer and performed jejunostomy in 7 cases, with 4 fatalities. He believes that the jejunostomy was of some use, even in 2 of the fatal cases. Of course, the outcome does not depend on any one factor. Jejunostomy adds very slightly to the risk, and is to be recommended in cases of large ulcer in which feeding by mouth would need to be long delayed. Whether it is advisable in other cases is doubtful.

Large saline infusions, followed later by saline rectal injections, add much to the comfort of the patient during the first days. Martens begins to give nourishment by mouth at an early date. Following recovery from the operation, every patient should undergo a thorough course of internal treatment for his gastric or duodenal ulcer.

There is a possibility that an advocate of early operation in these cases may open the abdomen and find that no perforation has occurred. There may be simply an unperforated ulcer, or the symptoms may have been due to some unexplained cause. Such a gastric crisis may be marked by intense pain, collapse, retracted abdomen, rigid muscles, pulse up to 150 or more, etc. There will, however, be no leukocytosis, and as the leukocyte count within a few hours after perforation ranges from 12,000 to 30,000, this is an important diagnostic difference. In any event, it is far better to open an uninflamed abdomen than to neglect a case of perforative peritonitis.

Operations for perforated gastric ulcers are so common as to excite little remark unless they are grouped together in large series. It is, however, out of the ordinary for the same patient to be twice operated upon for perforation of the stomach, and yet this happened in the experience of Cuff.[1] His patient was a man aged twenty-seven years. The first ulcer which perforated was in the upper and posterior surface of

---

[1] British Medical Journal, 1907, vol. i, p. 255.

the duodenum. The ulcer was sutured and the wound closed. Six months later anterior gastro-enterostomy was performed. The patient was free from pain and discomfort for seven months, then his old gastric symptoms recurred, and four years after his first operation a second perforation occurred, this time in the extreme left limit of the stomach. The abdomen was opened, the perforation closed, and the patient again recovered. There was an interesting point in connection with the after-treatment of this patient. After each operation he vomited repeatedly. The vomiting was checked by putting him in an upright position.

Willis[1] reports twice operating upon a patient for perforated gastric ulcer, his patient being a man aged thirty-three years. The first ulcer which perforated was in the cardiac end of the stomach. About ten months later a second ulcer perforated near the pylorus. Both of these were closed by sutures. At the second operation the stomach was carefully inspected, and absolutely no trace of the first ulcer or of the operation which closed it could be discovered. The patient a second time made a good recovery. Operation in both instances was performed within three hours of the time of perforation.

Schnitzler reported to the Vienna Medical Society in December, 1907, that he had operated twice for perforated gastric ulcer in the same patient. The ulcers followed within a year after a gastro-enterostomy.

OPERATIONS FOR ULCER OF THE STOMACH. In PROGRESSIVE MEDICINE for June, 1907, p. 75, I gave considerable space to the consideration of the late results after treatment for gastric ulcer. It is useless to show the physician that operative treatment has a low mortality unless it can also be shown that the beneficial results are likely to be permanent. Statistics upon this point are particularly unsatisfactory, and more is probably to be learned from the conclusions of individuals whose personal experience has been large than by simply adding together accumulated reports.

Musser[2] expresses it as his belief that the medical treatment of simple gastric ulcer is attended by the best results whether the immediate or remote outcome is considered. He would therefore advocate surgical treatment only on the following conditions: perforation, repeated and chronic hemorrhage, retention from obstruction, dilatation, hour-glass contractions, persistent adhesions. He calls attention to the fact that most patients are operated upon between the thirtieth and fortieth years of age, and have an ulcer history of five or ten years' duration. The extraordinary frequency of chronic gastric ulcer with complications requiring operation is due to neglect of the treatment of an ulcer in its incipiency. Musser has included in his article a *resume* of most of the published articles on gastric ulcer, and has so arranged his tables of

---

[1] British Medical Journal, 1907, vol. i, p. 926.

[2] American Journal of the Medical Sciences, 1907, vol. cxxxiv, p. 781.

statistics as to answer the different pertinent questions in connection with this disease as far as they can be answered by statistics.

Turning now to the statistics of French cases, we find that Parmentier and Danechau have followed up 152 patients after operation. They divided the results into three classes: 7 per cent. bad, 39 per cent. fair, and 54 per cent. good. Over 90 per cent. of the patients were in a better condition than before operation. The best results followed operation for pyloric stenosis, due to healed ulcer. Postoperative symptoms, according to their findings, are most likely to occur in cases of bilocular stomach, and in those in which the ulcer is far from the pylorus. Careful dieting after gastro-enterostomy is always desirable for a time. Then vegetable broths, milk, and raw eggs should be followed later by farinaceous diet, and still later by a mixed diet, the meat being finely minced or chewed. Alcoholic drinks should not be given.

Paul[1] is opposed to early feeding after *gastro-enterostomy*. He considers that it is unnecessary, and that it may do harm. For two days nothing is swallowed. The patient may rinse the mouth out, but it is better not to swallow at all. Sufficient fluid can be given by the rectum. On the third day water in teaspoonfuls may be allowed, and on the fourth day water and beef tea. A day or two later a gruel made with half milk and half water is suitable in small quantities. The later additions to the diet may be gradual, as no good purpose is served by hastily resuming a full diet; on the contrary, a contracted stomach favors a complete cure. If a patient can not stand a few days' starvation, he is not in a suitable condition for gastro-enterostomy.

Physiological Effects of Gastro-enterostomy. But while one set of observers are considering the late results of gastro-enterostomy as seen in the patients operated upon in this manner, another set are engaged in the effort to find out by experiments on animals, as well as by tests of human secretions, just what the effect of a gastro-enterostomy is upon the functions of the stomach. It is now generally admitted that a certain amount of bile finds its way into the stomach, as least in the early days after the operation. Paterson[2] thinks that the quantity is usually small, as so little is required to give a Gmelin test, namely, about 5 per cent. Dastre and Masse have pretty well proved that normal bile in the stomach of a healthy dog does not interfere with digestion at all. Moynihan has pointed out the same fact in the case of the human stomach in some cases.

The acidity of the gastric juice is reduced after gastro-enterostomy. This is in part due no doubt to the entrance into the stomach of a certain amount of bile and pancreatic juice, but there are reasons for believing, however, that the problem is not merely one of simple neutralization. Be that as it may, the reduction in acidity is considerable, averaging

[1] British Medical Journal, 1907, vol. ii, p. 1113.
[2] Journal American Medical Association, 1907, vol. xlix, p. 657.

according to Paterson about 35 per cent. Probably there is an earlier stimulation of pancreatic secretion after gastro-enterostomy than was the case before its performance. If follows from these facts that, so far from eliminating gastric digestion altogether, the operation of gastro-enterostomy may improve it. Certainly this may be the case if there is no impairment of the motor functions of the stomach. Observers have not been at all in accord in their conclusions on this point; and this is not to be wondered at when the complexity of the problem is considered. There must be the same tests before and after the operation. There will even then be the doubt whether or not the gastro-enterostomy is acting, for the tendency of a small opening to close in the course of a few weeks is very great. Cannon and Blake[1] found by x-ray observations upon dogs that if the pylorus is not obstructed food will continue to pass through it, unless the opening is a very large one. Their observations and those of others seem to indicate that the operation itself does not reduce the motor function of the stomach, and if such action had been impaired by a pyloric stenosis, that it is often improved by gastro-enterostomy if the opening is made large. If, then, it is true, as some of the best authorities now hold, that gastro-enterostomy is not a drainage operation, but that its good effects are due to a reduction of the acidity of the gastric juice, it has a field wider than that of relief of pyloric stenosis alone. One should not be led into the hasty performance of the operation, however, in the mere hope that it may cure whatever symptoms of disordered digestion may be present in any patient.

Jejunal Ulcer after Gastro-enterostomy. Various theories have been advanced to explain the occurrence of ulceration of the jejunum following gastro-enterostomy. There are those who regard such an ulcer as peptic in origin, caused by the simultaneous influence of a disturbed circulation together with the digestive action of gastric fluid containing hydrochloric acid. There are others who regard the ulceration as strictly of bacterial origin. At the present time the peptic theory has many supporters. Be that as it may, it is striking that such ulcers are not more common, especially when one considers that gastric juice previous to operation in many of these patients shows an excess of acidity. This acidity is directly lessened by the action of the gastro-enterostomy. In the first place retention of food in the stomach with accompanying fermentation is done away with. Then, in the second place, the alkaline fluid in the small intestine (bile and pancreatic juice) mixes more or less with the stomach contents, and neutralizes to that extent the hyperacidity of the latter. Kausch, Kreuzer, and others have shown that the remains of food in the stomach from gastro-enterostomy always contain a little bile. Katzenstein, after many experiments upon animals, says that a gastro-enterostomy does not heal an ulcer by emptying the stomach,

[1] Annals of Surgery, 1905, vol. xli, p. 686.

for the food remains in such a stomach just as long as it does in a normal one. The healing is due to chemical changes produced, and chiefly to the reduction of acidity.

Several writers have recognized the value to the patient of this admixture of intestinal and gastric fluids, and in the light of this knowledge, attempts to so operate as to prevent such a mixture are irrational. For example, Roux, the inventor of the gastro-enterostomy in Y, has pretty nearly abandoned it for the usual form of gastro-enterostomy, saying · a patient so treated has his own drugstore inside of him, and is able to neutralize his too acid gastric juice, and so to heal his ulcer, without at the same time disturbing his own digestion.

In cases in which unfavorable circumstances, such as an imperfect anastomosis, interfere with this favorable action of the gastro-enterostomy, there is always danger of the formation of a peptic ulcer, either at the site of the anastomosis or in the jejunum. The best way to avoid such complications is to handle the parts with great gentleness during the operation and to enforce careful postoperative treatment.

Schostak,[1] who has devoted himself to the study of this subject, collected statistics of 35 cases, chiefly German. It was striking that only 3 of these patients were females, and yet at least as many women as men are operated upon for ulcer of the stomach. Perhaps the difference is due to the fact that men are more fearless about their diet after an operation, and are more likely to partake of alcoholic beverages, for they are specially injurious after gastro-enterostomy. Another striking fact is the rarity of peptic ulcer when gastro-enterostomy is performed for cancer. The reason for this is apparently the low acidity of the gastric juice in cases of cancer of the stomach.

Another point worth mentioning is the period at which the ulcer occurs. This in one-fourth of the cases was observed within six months of the operation. In one-half of the cases it was within the first year after operation, and in three-fourths of the cases it was within two years.

Like ulcer of the stomach, peptic ulcer may produce an immediate perforation, or it may run a chronic course. In rather more than one-half of Schostak's cases it was situated in the jejunum, and in the remainder it was situated at the site of the gastro-enterostomy, involving both the stomach and intestine.

In a monograph upon the subject of peptic ulcer (January and February, 1906, *Revue de Chirurgie*) Gosset made a most complete search for reported cases of peptic ulcer of the jejunum, of which he was able to find 31 cases. Since that time a number of others have been reported, 8 of which are alluded to by Connell;[2] 6 other cases are reported in the *Journal of the American Medical Association*, December 7, 1907, p. 1963. Most of the cases are from German literature, where the anterior form

---

[1] Beiträge z. klin. Chir., 1907, vol. lvi, p. 360.
[2] Surgery, Gynecology, and Obstetrics, 1907, vol. vi, p. 39.

of gastro-enterostomy has been more frequently employed than has been the case elsewhere.

Connell believes that the long loop operation is also more likely to be followed by peptic ulcer than is the case when the anastomosis is made close to the duodenum. Peptic ulcer of the jejunum should be considered in all cases in which there is a return of symptoms following gastrojejunostomy. Prophylactic treatment to reduce the excess of acidity should always be carried out after gastrojejunostomy, and continued for at least six months. If symptoms of ulcer arise, the decision to operate will rest upon essentially the same grounds as in primary ulcer of the stomach. In most of the reported cases perforation had occurred previous to operation, but this is, of course, not always the case in peptic ulcer. The symptoms may be latent until the occurrence of acute hemorrhage or perforation.

The results of secondary operation in cases of peptic ulcer of the jejunum, following gastro-enterostomy are for the most part very unsatisfactory. In view of this fact, Hemmeter[1] advises a very extensive attempt with internal treatment before proceeding to a second operation. Indeed, he very wisely counsels surgeons to give their patients the benefit of medical treatment both before and after gastric operations, since it is possible to reduce the hyperacidity of the gastric juice, and thereby to lessen the possibility of postoperative peptic ulcer. After every operation for benign affections of the stomach when a hyperpeptic gastric juice continues to be secreted, strict diet, rest, mineral waters, olive oil, alkalies, and such other chemical agents as experience has shown to be of remedial value should be continued for a long time.

Crile[2] states that surgical treatment has failed or made a poor showing in *simple dilatation of the stomach without obstruction*, especially in neurasthenics, in splanchnoptosis, and in acute ulcer of the stomach without obstruction of the pylorus. It is less effective than other methods in hemorrhage from ulcer. While these views are not shared by many of his surgical confrères, all will concur in his conclusion that the best results are to be obtained by the close association of the surgeon and internist in the care of patients suffering from these troubles.

He thinks that an improvement in the surgical treatment of gastric carcinoma must come as a result of earlier methods in diagnosis, or possibly as a result of earlier explorations in suspected cases. Surgical treatment has thus far failed in cases of gastric carcinoma too far advanced for excision, but not causing obstructive symptoms. If obstruction exists, gastro-enterostomy is the best treatment. If it is possible to remove the whole tumor, this should be done, as it increases the comfort of the patient, prolongs life, and gives a chance of freedom from recurrence.

[1] Medical Record, 1907, vol. lxxii, p. 801.
[2] Journal American Medical Association, 1907, vol. xlix, p. 1050.

Syphilis of the Stomach is a subject not alluded to in most of the surgical text-books recently published, and even in books especially devoted to the organs of digestion it receives scant mention. A Russian, named Roudnitzky,[1] who had opportunity to observe two cases, both in men in middle life, found the chief symptoms to be epigastric pain coming on after eating and lasting from one to three hours, slight interference with respiration, loss of weight, epigastric tenderness, and a tumefaction convex downward, its lowest point about 4 cm. (1.6 inches) below the tip of the ensiform cartilage. This mass moved with respiration. The duration of the symptoms (eighteen and six years, respectively) and the lack of hemorrhage ruled out carcinoma. The absolute failure of treatment spoke against chronic gastritis. There were no evidences of perigastritis, nor was the stomach dilated, as shown by examination and absence of vomiting. Each patient had been the father of more than twelve children, half of whom died in infancy, and there were some things in the personal history pointing toward syphilis. A thorough antisyphilitic treatment caused the disappearance of both tumefaction and symptoms.

Gastroptosis. Most men who have given special study to the question of abdominal ptosis have been convinced that pregnancy and labor are the chief factors in its occurrence. During pregnancy the abdomen is not properly supported, and in consequence the muscles and the skin become abnormally distended. This might be in large part prevented by the wearing of a suitably constructed corset or abdominal bandage. Similarly, after labor the abdominal wall is not supported for a sufficient length of time. Often a binder is applied while the patient is in bed, when support is of less importance, and no attention is paid to the support of the abdominal walls when the patient again gets up.

Before resorting to operation as a cure of visceral ptosis, one may test the probable results of an operation by placing the patient on a flat, slightly inclined plane and letting an assistant seize the lax abdominal walls with both hands and take up as much slack as might be overcome by operation. The surgeon should then note the effect upon misplaced abdominal organs. Should this test prove that an operation would be a benefit, it is performed by Cumston[2] as follows: An incision is made from a little below the sternum to the pubis. The aponeuroses of the recti muscles are exposed and dissected back for some distance; the recti muscles are then freed posteriorly to permit of their overlapping and suture; the anterior aponeuroses are then sutured; surplus skin is removed, and the skin is sutured.

GASTROPTOSIS FOLLOWING CHILDBIRTH. Bassler[3] also attributes many cases of gastroptosis in women to the failure to properly support

[1] Prakt. Vratch., August and September, 1907.
[2] Medical Record, 1907, vol. lxxii, p. 639.
[3] Therapeutic Gazette, September 15, 1907.

the abdomen after the patient leaves her bed following childbirth. He advises the wearing of a support for a number of weeks, during which period an effort should be made to strengthen the abdominal muscles by frequently repeated voluntary contractions of the recti below the umbilicus, as well as by the following exercises, taken in a dorsal position: elevation of the thighs, the legs being at the same time fully extended; elevation of the body to an erect position, the feet being held down. Incidentally, this treatment almost invariably results in a gain in weight of from seven to thirty pounds. When it is faithfully carried out it will render operation unnecessary.

THE SMALL INTESTINE.

Foreign Bodies in Alimentary Canal. Attention has often been directed to the great numbers of metallic objects and other foreign bodies which some persons, chiefly insane, have swallowed with impunity. This is the common result, but not the invariable one, and there have been placed on record many instances of perforation of the stomach or intestine due to a swallowed foreign body. That such is not oftener the case is due, according to Ross,[1] to the pliability of the gastric and intestinal walls, to their free mobility, and to the occasional inclusion of the foreign body in portions of swallowed food. Exner and, later, Müller find that foreign bodies may be turned about as they move along the canal. The point catches in some corrugation of mucous membrane and the foreign body moved by the current may swing completely around. If the foreign body, on account of its length, or for some other reason, becomes fixed, peristaltic action, etc., forces it into the mucosa, inflammation and pressure necrosis set in, and perforation may result. The most frequent sites of perforation are the appendix and rectum. The other portions, in the order of their frequency, are the large intestine, small intestine, and stomach. The thick walls of the stomach, the size of its cavity, and its active peristalsis are all against perforation. A foreign body is not likely to remain in one place long enough for pressure necrosis to occur, and hence the rarity of perforations in this part of the alimentary tract.

It is difficult to estimate the length of time during which a foreign body may remain in the stomach or intestine without perforation. In one case a spoon was known to remain in the stomach and duodenum two and one-half years, and then cause perforation, possibly as a result of pregnancy. In another case a broken bodkin perforated the duodenum twelve days after it was swallowed.

The diagnosis of perforation due to a foreign body has rarely been

---

[1] New York Medical Journal, 1907, vol. lxxxvi, p. 880.

made before the abdomen has been opened. In most cases there has been no history of the swallowing of a foreign body, and the symptoms have not been such as would indicate it. Usually a diagnosis of appendicitis has been made.

If a foreign body is lodged in, or perforates the rectum, a careful inspection through a proctoscope will reveal its presence, and lead to its removal. In rare instances perforation of the intestine has produced swelling of the intestine sufficient to obstruct its lumen.

Gun-shot Wounds of the Abdomen. That immediate laparotomy is the best treatment for gun-shot wounds of the abdomen has been questioned by a number of observers of the results in the Boer and Japanese wars. Nor is it possible to dismiss these results as wholly inapplicable to civil life. It is true that the military bullet of small caliber, with high velocity, produces an explosive effect when it strikes at close range a portion of the body rich in fluid, such as a large bloodvessel, or the intestine, or bladder when full; but this explosive effect diminishes with distance, and disappears at a distance of about 250 steps. v. Oettingen[1] recognizes that treatment of abdominal wounds in war tends to become more and more like the practice in civil life, as methods of treatment are simplified and military facilities are improved. This writer sees only four conditions which demand immediate operation: an extensive wound, prolapse of an abdominal organ in a wound, the presence of a foreign body in a wound, and continuing intra-abdominal hemorrhage. He believes the mortality in the Japanese war following gunshots of the abdomen was not far from 50 per cent., and that the statistics published, giving individual experiences in a limited number of cases, and showing a mortality sometimes as low as 8.5 per cent., are most misleading. This sounds rather discouraging, but when one reflects that in the Franco-Prussian war the mortality following abdominal wounds was no less than 70 per cent., there is some cause for congratulation. This improvement is due chiefly to the advance made by surgery, for the "humane" qualities of the high velocity bullet have not fulfilled expectation. Col. Roman Romanovitsch de Wreden says that it is humane "on condition that war be carried on in a warm season (before the frosts set in), in a dry district, with soft, stoneless ground, remote from rocks and stone buildings; that the intestine and bladder be carefully emptied before battle; that the combatants when firing approach no nearer than 250 steps, and that all aiming at the head be strictly forbidden."

Bornhaupt[2] contributes a most interesting article upon this subject. He observed 162 patients with gun-shots of the abdomen, but they did not come under his treatment until some days had elapsed, as the hospital was stationed well in the rear of the army.

The summary of his results shows that non-operative treatment

[1] Arch. f. klin. Chir., 1906, vol. lxxx, p. 161.
[2] Ibid., 1907, vol. lxxxiv, p. 629.

was followed by 70 per cent. of recoveries. Most of the remaining 30 per cent. of patients were operated upon later. The mortality following such late operation was 46 per cent.

It is also of interest to note that many of these operations were to drain one or more suppurating hematomata, either of the abdominal wall (9 cases, with no death), or of the pelvic cavity (8 cases, with 4 deaths).

These pelvic hematomata were due to perforation of the stomach or intestine, with hemorrhage and a discharge of alimentary material into the peritoneal cavity. An upright position of the patient carried this into the pelvis. Some of these patients walked miles after injury. In a number of them the original wound in stomach or intestine had closed before operation for the suppurating pelvic hematoma. Operation in such a case should be limited to incision and drainage of the abscess cavity, with the least disturbance of the rest of the peritoneal cavity. Of course, a patient with a demonstrable quantity of blood in his peritoneal cavity should, if possible, be operated on at once, so as to avoid the 50 per cent. mortality of these later operations. Bornhaupt advocates early operation in all cases in which there are signs of escaped fluid from stomach or intestine. The mortality from his late operations in these cases was 85 per cent.

The promised low mortality following operation for *penetrating abdominal wounds in civil life* has not yet arrived. Imbert[1] reports 35 cases in his own hospital service in the three years just passed. The mortality was 60 per cent., and if one excludes from the list 10 cases in which the peritoneal cavity was opened, but no viscus injured, the mortality is 75 per cent. Even when the patient was operated on in the first six hours after injury, the mortality was 66 per cent. Postmortem examination in all of the 21 fatal cases showed that in 6 of them perforations of the stomach or intestine had been overlooked. This shows the necessity for minute inspection of the parts in such cases, and helps also to explain the high mortality after operation.

In illustration of this point and as an instance of multiple perforations from a single bullet, it may be mentioned that Swayze recently sewed up thirteen perforations of the large and small intestine, including one of the appendix, due to a pistol shot. Surely in such a case spontaneous cure would have been impossible; for it is not to be supposed that contraction of the intestinal muscles could have prevented leakage from all of these wounds. Indeed, many of them were already leaking at the time of the operation, although this was performed within a very short time. Thanks to the prompt closure of all wounds by purse-string sutures, and perhaps also to the administration of half-gallon hot saline rectal injections several times a day, by the continuous drop method, the boy made a prompt recovery.

[1] Rev. de Chir., 1907, vol. xxxvi, p. 597.

Non-penetrating Injury of the Stomach and Intestines. Rupture of the duodenum following a blunt injury is one of the rarer accidents constituting probably not more than 5 per cent. of such injuries of the stomach and intestine; and yet Meerwein[1] has been able to extract from the literature 64 cases of such injury, giving a brief history of each case, and adding the report of a case of his own. Most of these patients were injured by a blow, such as the kick of a horse in the epigastric region, or by a fall upon some relatively sharp object, such as the corner of a box, or by crushing between cars, or by the passage of a wheel across the body. Meerwein follows the older theories in interpreting the causes of such injuries, and believes that intestinal rupture in such cases is sometimes due to bursting of the intestine, and in other cases, to the fact that it is dragged away from its attachments, assigning to only a part of the cases a cause which alone will explain all, and that is the crushing of the intestine or its mesentery, as the case may be, between a hard object and the spinal column. This theory was fully explained in PROGRESSIVE MEDICINE for June, 1907, p. 98. Theories of injury aside, the point of immediate practical importance is naturally the diagnosis. This is as yet obscure in many cases. Tenderness on pressure in the region of the duodenum is the most significant symptom. In a few cases there has been vomiting of blood. In some cases the percussion note is tympanitic, and the liver tenderness disappears or is reduced in area. Other symptoms are early vomiting, possibly of bile, muscular rigidity, and a rapid pulse. In the presence of such symptoms, operation is strongly indicated.

The mortality following operation has been high. Few operators have been successful in saving more than one case in three, and no one has saved more than one-half of the patients operated upon. This mortality is slightly higher than that given for similar operations upon the other portions of the intestine. It is in part due to the prompt development of peritonitis, and in part to the complications which often accompany a severe injury of the duodenum, such as rupture of the liver or pancreas or kidneys, or injury of the stomach or of one of the branches of the portal vein.

It is worth remembering that peritonitis may follow retroperitoneal rupture of the duodenum as well as rupture into the free peritoneal cavity. In spite of the bad prognosis, treatment other than operative is not to be considered for a moment in severe injuries of this character. The best incision for exploration and repair is a median one between the ensiform cartilage and the umbilicus. Small openings in the duodenum should be closed by suture. If the destruction is more extensive, one should not hesitate to resect this portion of the intestine as well as any other. This was the operation performed in Meerwein's case, combined

---

[1] Beit. z. klin. Chir., 1907, vol. liii, p. 496.

with a posterior gastrojejunostomy. A small fistula formed in the wound, but closed in about two weeks; the patient made a complete recovery.

Rigidity of the abdominal muscles coming on after a blunt traumatism is justly held to be one of the surest signs of intra-abdominal injury. And yet it may occur without injury of any viscus. Eliot[1] records such a case. A man aged thirty years was struck and thrown by an automobile. He was unable to stand. There were contusions in the back and lumbar regions, but no muscular rigidity. Within twelve hours rigidity developed especially in the lower left quadrant, where a hematoma could be made out. There was a leukocytosis of 23,000, but the general condition was excellent. The abdomen was opened. A properitoneal hematoma was present, also retroperitoneal effusions of blood in both iliac fossæ, but no intraperitoneal lesions. The wound was closed and the patient recovered, the rigidity passing off in less than a week. To some this may seem like meddlesome surgery, but the question in such a case must always be, "Is the risk of an exploration as great as the risk of allowing extravasation to take place, or internal hemorrhage to go on unchecked?" If the answer is "No," the abdomen should be opened promptly.

Present State of Operation for Typhoid Perforation. Allaben[2] contributes to medical literature a noteworthy article upon this subject, his interest in which was stimulated by the loss of his own son, at the age of seventeen years. The boy was operated upon thirty-seven hours after the perforation occurred, and recovered with a fecal fistula. Nineteen days later a second operation was performed, in a search for an abscess which was not found. Fifteen days after the second operation, the abdomen was opened the third time for intestinal obstruction, which existed in the form of a band. This was relieved, but the patient died eight hours afterward. Subsequent examination revealed an abscess in the pelvis, containing about five ounces of offensive pus.

The statistics of operation for typhoid perforation show a gradually decreasing mortality. The early statistics of Keen gave a mortality of over 80 per cent.; whereas, the mortality in 150 cases operated upon in the years 1903, 1904, 1905, and 1906 show a mortality of 62.3 per cent. The patients operated upon within eight hours of perforation show a mortality of only 55 per cent. The ileum is the seat of perforation in about 95 per cent. of the cases, the perforation almost always being within eighteen inches of the cecum. The symptoms usually observed in such cases are pain in the abdomen, rigidity of the abdominal muscles, tenderness, increase of pulse rate, and rise of temperature, nausea, chill, tympany, disappearance of liver dulness, movable dulness in the flank, and a facies characteristic of shock and sepsis.

---

[1] New York Medical Journal, 1907, vol. lxxxvi, p. 49.
[2] Journal of the American Medical Association, 1907, vol. xlix, p. 554.

According to Murphy, the symptoms of perforation are "sudden and severe pain, nausea and often vomiting, local hypersensitiveness, and absence of peristalsis in the painful area."

Hayes says that the three cardinal symptoms are sudden pain, rigidity, and tenderness of the abdomen to pressure. When these three symptoms are present in any case of typhoid fever, operation is indicated and demanded.

While some operators employ extensive flushing of the abdominal cavity with normal saline solution, and others recommend the removal of extravasated material by sponging, still others reject these measures as consuming time and adding to the amount of peritoneal shock.

In this connection it is interesting to recall Murphy's plan of treatment for septic peritonitis:

1. Rapid execution with the smallest amount of work possible in the abdominal cavity consistent with the exigencies of the case.

2. The avoidance of every procedure calculated to favor the extension of infection or absorption of bacteria, such as mopping away debris and lymph deposits on the intestines and flushing the abdominal cavity.

3. The providing for thorough drainage by rubber tubes and posture (Fowler's position).

4. The elimination of toxins.

Lymph deposits from the intestines should not be mopped off, as this is a positively harmful procedure. The profound symptoms observed in septic peritonitis come on some hours after perforation, and are due to the absorption of bacteria and of septic material. Murphy's plan of eliminating toxins is to pass a soft rubber rectal tube and connect it with a fountain syringe containing warm, normal saline solution. The syringe is raised only a foot or two above the abdomen, so that the flow shall be extremely slow. The administration should be repeated every two hours, with the patient in a semirecumbent position, like that assumed in a steamer chair. In this way nine quarts of salt solution may be given every twenty-four hours without any of it being expelled into the bed. It is important that the tube shall allow a free flow in either direction, according to changes in the abdominal pressure; hence no clamp must be used, but the hydraulic pressure must be regulated solely by the height of the syringe.

In discussing Allaben's paper, Murphy mentioned the fact that he has treated forty-one patients with general suppurative peritonitis in accordance with the above principles, and that only one of these patients died. Peritonitis in each case was due to perforation of the alimentary canal.

Resection of Intestine for Embolus. Childe[1] successfully removed nine and one-half feet of small intestine from a patient aged fifty-nine

---

[1] British Medical Journal, 1907, vol. ii, p. 891.

years.   Operation was performed about fourteen hours after an attack of severe abdominal pain and nausea.   When the abdomen was opened it was found that the lower portion of the small intestine was gangrenous, the gangrene being due to embolism of the superior mesenteric artery, just beyond the origin of the ileocolic artery (Fig. 35).   The patient
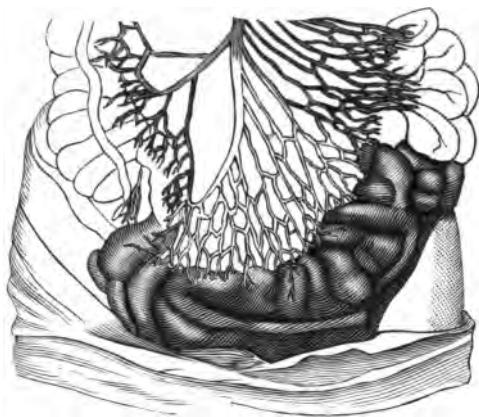

Fig. 35.—Sketch of the small intestine, showing the portion which was gangrenous in Childe's case.

recovered with a tendency to diarrhea sufficient to require the administration of opiates.   This is a remarkable result, considering the age of the patient.   She was, however, poorly nourished, and died seven months later.   The largest amount of small intestine removed with recovery from the operation is about eleven feet, an operation reported by Ruggi.

THE APPENDIX.

Etiology of Appendicitis.   An interesting question is the influence of a fecal concretion or a foreign body in determining an attack of appendicitis following an injury.   In their book upon the appendix, Kelly and Hurndon report a series of fifty cases in which it was alleged that an attack was brought on by injury; at any rate, the symptoms developed within a few hours.   Or if the well-marked attack of appendicitis did not occur for some time, some symptoms of pain and indigestion were noticed immediately following the injury.   In 40 of the 50 cases the appendix presented some abnormality in form or position, and in 30 of these there were concretions.   They make the statement that no case has as yet been reported in which traumatism brought on an attack of inflammation in an appendix previously normal.

Battle[1] says that this question will increase in importance in England on account of a new Employer's Liability Bill. Before the passage of such a bill appendicitis and other abdominal lesions were frequently ascribed by domestic servants to strain, overlifting, etc. If, in accordance with the new bill, large sums for damages may be obtained, such claims are likely to increase in frequency. If the traumatic origin of appendicitis becomes established, it will have its bearing in accident insurance cases, as well as in suits for damage. Battle looks upon cycling and motoring, and especially the riding of a motor bicycle, as possible developers of acute appendicitis when the organ is previously diseased.

Another interesting question in connection with appendicitis is the evident increase in frequency of this disease during the last twenty-five years. There have been many attempts to explain away this increase— for example, it has been stated that many feeble children now grow up in consequence of better care in infancy, when formerly they would not have lived to the age at which appendicitis is common. Another explanation is that appendicitis was not previously diagnosticated. While this is true, still cases of perforated appendix would have been recognized at autopsy had they occurred with frequency equal to the present rate of appearance; and yet Fenwick, who examined the postmortem records of the London Hospital for a period of forty years preceding 1884, found only 19 cases of disease of the appendix.

Pathologists are generally agreed that appendicitis is due to germs which are harmless so long as they are confined to the interior of the intestinal tract. As soon as they gain admission to the tissues outside of the epithelial lining, they cause dangerous inflammatory changes. What may then be the reason for their escape? Some have attributed it to the eating of too much meat, but it is doubtful if we eat as much meat as our forefathers did a century ago. Others have thought that the enamel of cooking vessels crumbles during the preparation of food, so that particles of it may find their way into the appendix. Still another theory, which Battle takes rather seriously and discusses at length, is the possibility that particles of steel from rollers with which flour is now universally crushed are eaten with bread, and occasionally lodge in the appendix. Battle mentions a case of a boy, aged thirteen years, from whom he removed the appendix for repeated paroxysmal attacks of pain. There was a soft, fecal concretion in its distal portion, with erosion of the mucous membrane. In the concretion was a small, irregular fragment of iron, of such a character that it was considered to have come from one of the rollers in a flour mill. Further support of this theory—and it certainly needs considerable additional support—is accorded by the fact that appendicitis first became prevalent in the

[1] Lancet, 1907, vol. ii, p. 500.

United States, in which country roller mills were generally established before they became common elsewhere; and there are those who go so far as to say that they can trace the increase in cases of appendicitis in certain districts step by step with the adoption of roller process flour.

Crile[1] analyzed 1000 cases of appendicitis in order to determine the factors of chief etiological importance. A short meso-appendix in the proximal portion, tending toward angulation, seems to him the chief factor. Concretions and thrombosis of the artery play only a small part. Traumatisms or some gross error in diet are common exciting causes.

THE NATURE OF CONCRETIONS IN THE APPENDIX. Barry[2] calls attention to the fact that there is little agreement among observers as to the origin of concretions found in the appendix, and great confusion in the use of the terms to describe them. Some men have stated that calculi in the appendix are always enteroliths, and always found *in situ*. Others consider that many of these concretions are gallstones. Barry suggests that, if one excludes parasites, there are four classes of bodies which are found in the lumen of the appendix, in the following order of frequency: (1) Fecal moulds, *i. e.*, masses of inspissated feces somewhat resembling date stones in their appearance. (2) Enteroliths, or bodies in which the fecal constituents are mixed with calcareous material from the inflamed wall, and which may or may not have a foreign body as a nucleus. (3) Gallstones. (4) True foreign bodies.

Irritable Appendix. Black[3] describes what he calls an irritable appendix. Irritation may be due to mechanical abnormalities of the appendix itself or of its meson, or to a hyperplasia of lymphoid tissue, or to some changes in the nerve supply. He cites a number of cases in which irritable appendices were removed with great satisfaction to the patients, who were thereby freed from the attacks of appendicular colic and from the symptoms of indigestion and chronic constipation from which they had suffered. In all of these cases there was no inflammation of the appendix, but the irritation was due to the presence of a concretion, or to a foreign body, or to a kink, or to pressure from neighboring organs, or to internal pressure upon its own nerves due to interstitial changes in the appendix itself.

A New Symptom of Appendicitis. It is not often that a new symptom of appendicitis is brought to notice. Indeed the so-called new symptom must already have been noticed by thousands of those who have examined abdomens made tender by inflammation. None the less credit is due to Blumberg[4] for pointing out its diagnostic importance. The symptom alluded to is the pain caused when the hand is quickly removed

[1] Ohio State Medical Journal, June, 1907.
[2] Lancet, 1907, vol. ii, p. 511.
[3] New York State Journal of Medicine, 1907, vol. vii, p. 307.
[4] Münchener medizinische Wochenschrift, vol. i, p. 1177.

from the abdomen after it has been exerting a pressure. He claims that in the presence of fresh inflammation the pain caused by the sudden removal of pressure is greater than that caused by the pressure itself. If the inflammation in the peritoneum is at a standstill, or is disappearing, the pain due to the raising of the hand is less than the pain due to pressure, or there may be no pain whatever when the hand is lifted. Blumberg says that this sign has proved in his experience a reliable indication for prompt operation in those cases in which it was well marked, and that the reverse is equally true, *i. e.*, that there is no immediate need for operation in cases in which the sign is absent. While we can not accept without more corroboration such far-reaching conclusions, it is, however, extremely interesting that the possible clinical bearing of such a simple phenomenon should have been hitherto overlooked. What the value of this discovery is any operator can determine for himself in a short time.

Blood Count in Acute Appendicitis. Leukocytosis varies so much in different cases of appendicitis and peritonitis that it is of little value as a practical guide to operative treatment. An estimation of the percentage of polynuclears is a simple procedure, and is more reliable than any other method of blood count. Noehren[1] strongly advises that time be spent in making this test rather than others. He has found that a polynuclear percentage of 90 per cent. or more indicates a severe process that needs immediate operative interference. A percentage below 78 means a safe or mild process. If the count lies between these two extremes, it will be significant the closer it approaches to one or the other of them. The estimation of a polynuclear percentage is a very simple procedure, requiring only glass slides, a stain, and a microscope, and it should, therefore, not be neglected in any acute case of appendicitis.

Bier's Treatment Applied to the Appendix. One scarcely thinks of Bier's treatment of passive hyperemia as applicable to abdominal lesions, yet Jerusalem,[2] of Vienna, has employed it in the treatment of chronic appendicitis and as a means of loosening adhesions. Patients of the former class come finally to operation, while the symptoms due to adhesions disappeared after twelve to twenty treatments. The hyperemia was produced by the application of the large glass bell connected with an air pump during periods of twenty to thirty minutes each.

Hemorrhage after Appendectomy. The occurrence of postoperative hemorrhage in the experience of some of the best operators in the country has revived the question of the best treatment for the stump of an appendix. Wyeth ligates the meso-appendix with two or three separate loops of plain catgut, and ligates the appendix itself with silk or linen, as he does not trust either plain or chromic catgut for this purpose. The

---

[1] Annals of Surgery, 1908, vol. xlvii, p. 239.
[2] La Semaine Médicale, 1907, p. 588.

ligature around the appendix is about one-quarter of an inch from the cecum, and is tied very firmly. The appendix is next removed, and its stump is cauterized with carbolic acid and wiped with alcohol and dried. It is then dropped back into the abdominal cavity and covered by omentum.

Hessert reported before the Chicago Medical Society three cases of hemorrhage from the stump following appendectomy with a purse-string suture. In one of these the hemorrhage proved fatal.

Halstead has also reported a case of hemorrhage, the amount of blood passed by rectum· being estimated at fifteen ounces. The patient recovered. The technique in this case was as follows: The stump of the appendix was crushed, ligated by catgut, and then buried under a purse-string silk suture. In a second case the technique was the same except that the purse-string suture was of pyoktanin catgut instead of silk. This patient died of suppurative peritonitis, and the autopsy showed that the suture had untied and the ligature had slipped off.

Nicholson has experienced fatal hemorrhage. The appendix was clamped and cut off. Its stump was swabbed with carbolic and then with alcohol. The opening of the stump was then closed by stitches and inverted, a linen purse-string suture being employed.

Laplace has reported 6 cases of hemorrhage after inversion of the stump with double purse-string sutures.

Lund, Seelig, and Knott, have all seen dangerous hemorrhage after appendectomy with inversion of the stump.

Mayo also reports a similar case of hemorrhage, even though the stump of the appendix was crushed with an enterotribe before inversion.

Deaver has known 2 cases of hemorrhage into the bowel after inversion of the appendix and what he calls his bipolar suture. This consists of two rows of Lembert stitches, making a linear rather than a purse-string suture.

Wyeth[1] read his paper on the subject at the last meeting of the American Medical Association, and his views did not pass unchallenged.

Cannaday believes the purse-string suture, with inversion of the stump, if carried out properly, is absolutely safe. He carries the needle deep enough to include all coats of the bowel. At the base of the side of the meso-appendix there is sometimes an artery which might bleed after inversion. This is secured by passing the purse-string suture under it. He employs ten-day chromic catgut and covers the first suture with a second of fine plain catgut.

Dawbarn said that the bloodvessels should be tied individually before the purse-string suture. If this is done the operation will not be followed by hemorrhage.

MacLaren,[2] after using a single purse-string suture of catgut over the

[1] Journal American Medical Association, 1907, vol. xlix, p. 121.
[2] Ibid., p. 228

stump of the amputated appendix successfully in several hundred cases, then lost a patient from septic peritonitis due to escape of the intestinal contents, the purse-string suture having given way. His present plan is to use fine catgut for the inner purse-string suture and fine silk or linen for the outer purse-string suture. He regards catgut alone, whether plain or chromic, as an insecure intestinal suture.

Another plan which has been adopted by some operators, for example, Pennington,[1] is to ligate the appendix within the cecum, or so arrange a purse-string suture that the inverted appendical stump is included in the tied suture and does not ride above it free in the cavity of the cecum, as it does in most simple purse-string sutures. Complicated sutures of any kind are not to be advised, however, if for no other reason, for the single one that they take more time for their performance than simple ones. In this case if one wishes to use a purse-string suture, the simple plan is to pass with a needle a ligature around the artery of the stump. This may be placed on the cecal or appendical side of the purse-string suture, or it may be combined with it as described above. Possible hemorrhage thus being prevented, the stump may be inverted with impunity.

Deep Suppuration from the Appendix. Suppuration in the psoas muscle, while of rare occurrence, occurs ten times on the right side to once on the left, according to investigations of Lardennois.[2] This is because it is almost always of appendical origin, and yet the usual signs of appendicitis may be quite wanting. One of his patients suffered from four attacks of psoas abscess before the true cause was discovered. It goes without saying that in these cases the appendix is usually placed behind the cecum, in whole or in part. The treatment consists not only in drainage of the abscess in the groin, but in removal of the offending appendix, or in rare cases of the inflamed Fallopian tube or other organ involved.

Actinomycosis of the Appendix. According to Ponzet and Berard, 60 per cent. of the cases of actinomycosis of the abdomen have their origin in the right iliac fossa. In many instances it is impossible to determine the exact site of the invasion, but it is probably in the appendix in three-fourths of the cases. This is a comparatively rare disease, and but about 150 cases have been reported. The symptoms are said to be as follows:

Initial period of visceral manifestations; a period of vague pains in the right iliac fossa, possibly associated with diarrhea. The diagnosis of appendicitis will probably be made. Later, a large, hard mass may be felt, and at a still later period abscesses form, at first discharging fetid pus. Characteristic granules may be found in the pus of a recent abscess, and may sometimes be found at an early stage of the disease in the

[1] Journal American Medical Association, 1907, vol. xlix, p. 1844.
[2] Revue de Chirurgie, 1907, vol. xxxvi, p. 608.

stools. Sometimes this affection resembles tuberculous or malignant disease of the cecum, but in actinomycosis the mass is larger, more fixed, and there are no obstructive symptoms. According to Short,[1] prognosis either with or without operation is almost invariably fatal. Unfortunately, few patients are seen sufficiently early to make possible a removal of all diseased tissue. Merely opening the abscess does not postpone the fatal issue. The administration of potassium iodide in large doses, or of arsenic and calomel, is of benefit, according to some observers; while the Germans claim success with the injections of tuberculin. The sinuses may be washed out with dilute tincture of iodine or with peroxide of hydrogen.

Cancer of the Appendix. The rarity of cancer of the appendix is probably more apparent than real. Lecene[2] has collected from various sources 40 instances of cancer primarily in the appendix, observed within the past eight years. The growth is usually small, and the general appearance is not unlike that of chronic inflammation of the appendix, and hence the true nature of the lesion is likely to be overlooked unless microscopic examination is made of every diseased appendix.

Microscopically the lesions are those of typical epithelioma, usually of the cylindrical type, although cases of adenocarcinoma and alveolar carcinoma have been reported.

It is a disease of young life, being usually found between the ages of twenty and thirty years. In about one-half of the reported cases there was history of previous infiltration of the appendix too remote to be ascribed to the tumor itself. In none of the cases cited by Lecene was a diagnosis of the disease made before the appendix was examined, either at operation or autopsy. Although starting in the mucous membrane, a cancer soon involves the other coats of the organ. For illustrations of early and advanced cases, see PROGRESSIVE MEDICINE, June, 1905, p. 112. It is not known whether cancer of the appendix spreads to the cecum. The few cases observed in which both organs have been involved were so far advanced that it was impossible to say in which organ the disease was primary.

Josselin de Jong[3] says that most carcinomata of the appendix are benign in their clinical characteristics, although histologically their name is justified. They are small, definitely limited tumors, occurring in youth, and not forming metastases. Recurrence after removal has not been observed. For these reasons carcinoma of the appendix seldom reaches a considerable size, and is usually discovered accidentally during an operation or an autopsy. If this statement seems a contradiction in terms, one has only to think of a rodent ulcer or an epulis as illustrations of malignant tumors without malignant exhibits of growth.

[1] Lancet, 1907, vol. ii, p. 760.

[2] Bull. et Mém. de la Soc. de Chir. de Paris, 1907, No. 8.

[3] Mitteilungen aus den Grenzgebieten der Med. und Chir., 1907, xviii, p. 525.

Sarcoma of the Appendix. Carwardine[1] reports a case of primary sarcoma of the appendix of the round cell type in a female patient, aged forty-five years. So far as known, it is the third instance of this kind on record.

THE LARGE INTESTINE.

The Surgical Forms of Ileocecal Tuberculosis. The frequency with which tuberculosis of the intestine is found in the vicinity of the ileocecal valve has been attributed to the prolonged contact of the chyme with the mucous membrane of this portion, as well as to the peculiar circulatory arrangement of the cecum. The statistics of Fenwick and Dodwell show that in 85 per cent. of intestinal tuberculosis the ileocecal
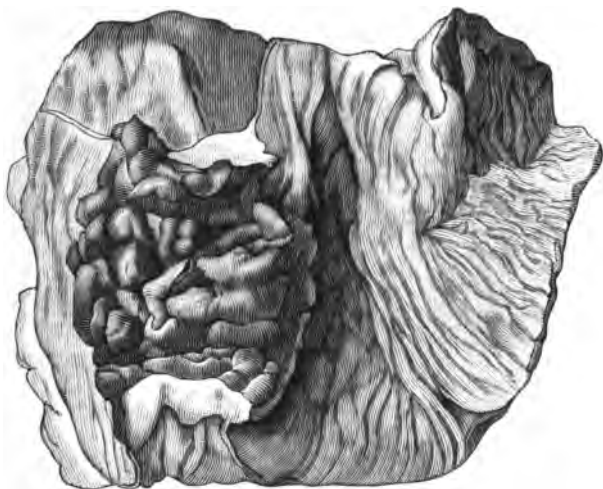

FIG. 36.—Hypertrophic tuberculosis of cecum. (Hartmann.)

region is involved, and in about 10 per cent. of these cases the ileocecal region is alone involved. This is fortunate, for the disease in this region is particularly amenable to surgical treatment.

It is only in the last fifteen years that the importance of ileocecal tuberculosis has been recognized. Previous to that many cases were looked upon as cancer. Billroth, Hartmann, and others deserve much credit for clearly bringing this fact to notice. A comparison of Figs. 36 and 37 will show how much alike the gross appearance of the two lesions may be.

In an address recently given before the Medical Society of London, Hartmann[2] reviews his own experience with this form of tuberculosis up to the present time.

[1] British Medical Journal, 1907, vol. ii, p. 1771.
[2] Revue de Chirurgie, 1907, vol. xxxv, p. 170, and British Medical Journal, 1907, vol. i, p. 849.

It is convenient to divide the cases into two classes: The first includes all cases of the ulcerative type, in which there usually exists a pericecal inflammation, as well as an inflammation of the adjacent part of the ileum. The appendix is often destroyed, and the whole of the ileocecal region is lost in a mass of adhesions interspersed with caseous matter and even purulent tuberculous cavities, sometimes communicating with the intestinal tract. When the tuberculous abscesses advance toward the abdominal wall, their rupture is followed by a pyostercoral fistula, usually in the right iliac fossa, although sometimes in the back or at the umbilicus or elsewhere.

FIG. 37.—Epithelioma of the cecum. (Hartmann.)

The second form of tuberculosis of the ileocecal region is hyperplastic. It is usually limited to the cecum, spreading in the direction of the colon (Fig. 38). Instances are on record in which this extension reached the transverse colon, or even as far as the sigmoid.

The cecum is greatly thickened, and is often included in a fibroadipose mass similar to that seen about the kidney in calculous pyelitis. In this mass there may be found enlarged lymph glands, more voluminous than the glands found in cancer of the cecum. In spite of this great thickening the cecum is generally movable. Sometimes it is displaced upward, so that the ileum enters it from below instead of at a right angle.

When the intestine is opened, its walls are found to be rigid and much thickened, and the cavity is much smaller than normal, but the stricture will usually admit the finger. Exceptionally there is a dilatation. The mucous membrane is ulcerated, and in places exuberant granulations project as polyps. If the appendix is involved, the lesions of the proximal part are most advanced. Thus, in appearance and manner of development, this hyperplastic form of ileocecal tuberculosis resembles certain

strictures of the rectum formerly classed as syphilitic, and now known to be tuberculous.

In this connection it is well to remember that certain strictures of the intestine hitherto classed as simple, because not exhibiting on microscopic examination the usual forms of tuberculosis, may none the less be of tuberculous origin. Poncet has shown that such unusual forms of tuberculous inflammations exist; and clinically Hartmann has observed two patients who made a prompt recovery from operation for what was considered simple stricture of the intestine, and who nevertheless died, one ten years later from phthisis, and one seven years later from pelvic suppuration with tuberculous mesenteric glands.
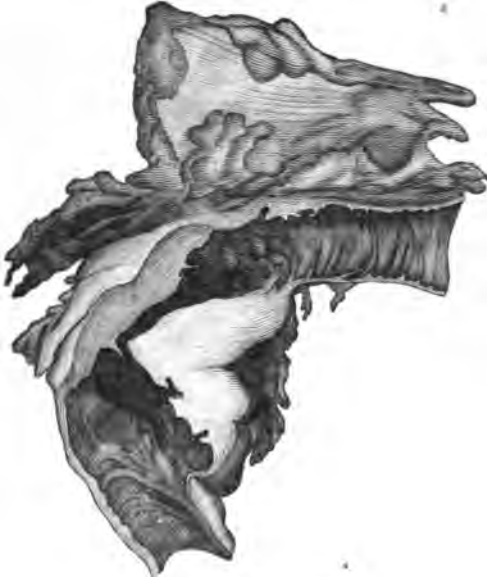

Fig. 38.—Tuberculosis of cecum and ascending colon. The bowel is opened and the omentum turned upward. (Hartmann.)

Patients affected with ileocecal tuberculosis may be entirely free from tuberculosis of the lungs, or if the latter exists, it is usually in an early stage. In this respect the disease under discussion differs widely from tuberculous enteritis, a condition which is secondary to pulmonary tuberculosis, and occurs in later stages of the same.

The very first symptom of ileocecal tuberculosis of the ulcerative type may be an acute attack of pain in the right iliac fossa resembling an attack of appendicitis. Tumefaction does not diminish after the acute symptoms have passed, but gradually extends toward the median line or the pelvis. Later, sinuses are formed.

The hyperplastic form of ileocecal tuberculosis has an insidious onset, with loss of appetite, slow digestion, and vague discomfort in the right

iliac fossa. Some months later symptoms due to stricture manifest themselves, such as colic, constipation, possibly alternating with diarrhea.

The treatment recommended by Hartmann[1] for hyperplastic ileocecal tuberculosis is the complete resection of the cecum, followed by lateral anastomosis between the ileum and ascending colon, the cut ends of both of these structures being closed by sutures. Left to itself, ileocecal tuberculosis proves fatal in two and one-half or three years.

Hartmann has operated in the manner indicated seven times, with only one death.

In the ulcerative form of ileocecal tuberculosis, resection is dangerous. The best form of treatment is unilateral exclusion obtained by anastomosing the ileum with the transverse colon, or bilateral exclusion may be performed.

Tuberculosis of the Mesenteric Glands. It is only occasionally that an operation is reported for tuberculosis of the mesenteric glands, although the glands are frequently involved in connection with extensive tuberculosis of the intestine. The symptoms which have usually pointed to disease of these glands have been pain in the right side of the abdomen or in its middle, loss of appetite and flesh, and later a palpable, usually movable, tumor. If emaciation is marked, the irregular surface of the tumor can usually be made out, being due to the enlargement of the different glands. The operative treatment of these cases consists in the removal of the individual glands, together with the resection of a portion of the intestine if this is simultaneously involved. Complete recovery may be achieved possibly after the persistence for a time of a fistula. Stark[2] had this experience.

Excision of the Cecum and Ascending Colon. Dobson and Jamieson[3] thus describe the complete removal of the cecum and ascending colon with the corresponding lymphatic area. The operation they describe was performed for carcinoma of the ascending colon, but it is equally as good for ileocecal tuberculosis. An incision seven inches long was made in the right semilunar line, the tumor in the ascending colon was defined, and the small intestine was packed off to the left side of the abdomen. The duodenum and the ileocolic vessels were then defined, the overlying peritoneum was divided, and a fairly large uppermost gland of the ileocolic chain was pushed downward. The artery and vein were then clamped and divided, the ligature being applied about one-half of an inch from the superior mesenteric artery. At this stage clamps were applied to the transverse colon close to the hepatic flexure and to the ileum, about six inches from the ileocecal valve. The peritoneum on the outer side of the ascending colon was then divided, and the whole mass, ascending colon, cecum, and terminal portions of the

[1] Revue de Chirurgie, 1907, vol. xxxv, p. 170.
[2] Beit. zur klin. Chir., 1907, vol. liii, p. 765.
[3] Lancet, 1908, vol. i, p. 149.

ileum, was drawn over to the left; the peritoneum, ileocolic vessels and chain of glands being stripped up as far as the duodenum. The ureter was seen and avoided, and some vessels were tied. The mesocolon was then divided from the duodenum to the selected point on the colon, some branches of the middle colic artery being tied. In the same way the peritoneum of the anterior layer of the mesentery was divided down to the ileum, and also the posterior layer. The terminal branch of the mesenteric artery was secured. The whole mass was now easily withdrawn from the abdomen, and the colon and the ileum were divided between the clamps; both open ends of bowel were closed by continuous suture of celluloid thread, three layers in the colon and two in the ileum.
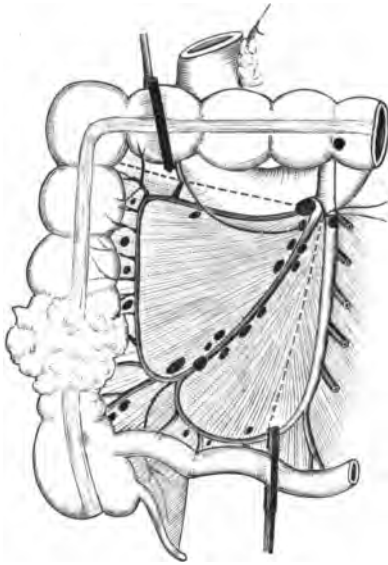

FIG. 39.—Diagram to illustrate resection of the cecum and ascending colon with their lymphatic area. (Dobson and Jamieson.)

Lateral anastomosis between the two portions of the gut was now effected, thus drawing up the mesentery and covering the denuded area on the posterior abdominal wall. A small, tubular drain was inserted through a wound made in the loin, and the anterior wound was closed in the usual way.

This operation, the scope of which is readily seen by reference to Fig. 39, is based upon anatomical studies of the lymphatic system of the ascending colon, cecum, and appendix. Thirty specimens were injected for study by the method of Gerota.

The operation is as good a one for ileocecal tuberculosis as it is for carcinoma. It presents no special difficulties. The blood supply of the portion of intestine to be removed is effectually controlled, and the

risk of contamination of the field of operation is minimized by deferring the division of the gut until toward the end of the operation. The removal of several inches of the ileum enables the small intestine to be brought up to the colon with ease, and allows of a satisfactory anastomosis being performed.

The term lymphatic area as here employed includes all the primary lymphatic glands receiving direct vessels from the organs involved, together with the lymphatic vessels and the tissues in which these vessels lie. It is suggested that the term "lymphatic area" be restricted in this manner, although there are few portions of the body in which the whole lymphatic area can be removed. It certainly is a mistake to speak of the removal of the lymphatic area in cases in which only a few regional lymph glands are removed.

Resection of the Colon. Some anatomical relations of the large intestine which should be borne in mind by those who resect any portion of it are pointed out by Okinczyg.[1] The ascending colon is nearer the median line than the descending, and it is somewhat movable, especially in its lower part. This is due to its more or less complete mesocolon, which in 30 per cent. of adults (and in a still higher percentage of children) has a length of 7 cm. (three inches). The hepatic flexure is covered by the liver. It may have a distinct meson, or it may be bound down to the duodenum and right kidney by the posterior peritoneum.

It is impossible to speak of a typical transverse colon, since its length varies from 38 to 87 cm. (15 to 35 inches) and its position varies accordingly. In general, the left portion is more movable than the right. The splenic flexure is fixed high up in 95 per cent. of cases, in contact with the left kidney, and without a meson. For this reason the descending colon is more nearly in a straight line than the ascending colon. It is immovably fixed in 64 per cent. of the cases.

The vessels which supply the large intestine make only a single loop of anastomosis, except at the ileocecal junction, at the hepatic and splenic flexures, and pelvic colon.

In removing a malignant tumor of the colon, difficulty may be experienced because of the masses of fat which have adhered around it. They should be crushed with clamps, ligated, and divided. Enlarged glands appear early with all malignant growths of the large intestine, but they are often the seat of merely inflammatory changes, and hence are no contra-indication to operation.

Hartmann[2] uses a double suture for anastomoses of the colon, the inner row of sutures penetrating all coats. He never employs a button unless the immobility of the parts makes a suture impracticable; for instance, in anastomoses with the rectum. In such a case the lower half of the button is passed up through the anus on a curved clamp.

[1] Zentralblatt f. Chirurgie, 1907, p. 1453.   [2] Ibid, p. 1452.

Non-malignant Diseases of the Sigmoid. Every year adds to our knowledge of diseases of the large intestine, and particularly of the sigmoid. While it is true that the surgeon, at least, usually sees patients with sigmoid diseases when obstruction has taken place, enough has been printed upon the early diagnosis of sigmoid diseases to give hope for better things in the future.

Patients suffering from non-malignant disease of the colon localized in the sigmoid flexure, as well as those with malignant tumors, will alike be benefited by earlier diagnosis. The inflammatory condition, if allowed to remain untreated, goes on to ulceration, with stricture formation or perforation, and there is reason to suppose that in some cases it is a direct antecedent of cancer.

By early diagnosis of malignant disease of the large intestine its thorough removal is insured, and a permanent cure is often affected, since lymphatic involvement in cases of cancer of the lower colon is confined to the corresponding portion of the meson.

Although some writers still deny the occurrence of a benign inflammation localized in the sigmoid colon, the cases which have been reported by different observers are sufficiently numerous to convince any impartial reader that this is a recognizable and fairly frequent disease. Rosenheim[1] has observed a number of cases, both acute and chronic. The usual form is a chronic one with acute exacerbations. The symptoms are pain and tenderness in the left lower abdominal quadrant.

There may be constipation, or diarrhea, with blood, mucus, or pus in the stools. If the process is acute, there will be left-sided muscular rigidity, and the pain may be acute and colicky. The sigmoid is palpably thickened and tender throughout an extent of several inches. If such a condition goes on for several weeks there is apt to be a considerable loss of flesh. In several of his patients Rosenheim observed a marked restlessness. It may be difficult to diagnosticate such a condition from cancer, although the violence of an acute attack, if such is present, and the extent of the swollen bowel are symptoms against malignancy. So also is the occurrence of blood in the stools early in the history of the disease. When this occurs in cases of malignant disease, it is due to the ulceration, and is usually not an early symptom. This point should be strongly emphasized, for if one waits for blood in the stools before making a diagnosis of carcinoma of the colon the most favorable period for operation will have passed. Many patients do not suffer from rectal hemorrhage up to the time that obstruction occurs. Three years ago, in speaking of this point,[2] I called attention to the fact that in Clogg's analysis of 25 cases of carcinoma of the colon, he found that rectal hemorrhage was mentioned in only 1. Other points which may be of value in distinguishing a benign case from a malignant one is the ease

---

[1] Deutsche med. Wochenschrift, 1907, vol. xxxiii, p. 411.
[2] PROGRESSIVE MEDICINE, June, 1905, p. 92.

with which the constipation in the former case is overcome by laxatives, and the improvement in the condition of the patient under bed treatment and a diet of vegetables, fat, and fruit.

The endoscope may be helpful in clearing up the diagnosis in non-obstructive cases, provided the lesion is situated as low down as the lower half of the sigmoid.

A typical benign case of mild character is the following: A somewhat nervous man, aged sixty-three years, with arteriosclerosis, suffered from gradually increasing constipation without apparent cause. The stools sometimes contained blood and mucus. Symptoms were not relieved by laxatives, and the patient lost much flesh. Abdominal pain increased and well-marked attacks of colic developed. The sigmoid was palpable. All of the symptoms disappeared under rest in bed, with hot compresses to the left side, and a diet of vegetables, fat, and fruit, with very little meat. In three weeks of such treatment the patient gained five pounds, and more than a year later he was well and no tumor was to be felt.

Sometimes the inflammation of the sigmoid rapidly proceeds to perforation, and before the usual symptoms have been produced. In such cases the inflammation is supposed to be limited to one or more of the diverticula which are frequently found in connection with the sigmoid. Brewer[1] reports such a case: A man, aged forty-five years, was suddenly seized with abdominal pain, nausea, and faintness. The symptoms continued for five days with fever, and at the end of this time there was a leukocytosis of 17,000, rigidity of the left rectus muscle, and a mass in the left iliac fossa. At operation a large abscess cavity was opened. It contained a fecal mass and communicated with the sigmoid colon through a small perforation. It was drained, and ultimately closed spontaneously.

The outcome of these cases is not always so fortunate. Thus, Rotter[2] mentions among others the following case: A man, aged fifty-eight years, who suffered for some time with abdominal and sacral pain, alternating diarrhea and constipation, was suddenly seized with intense pain in the sacral region, accompanied by loud gurgling. There was absolute obstipation, but no vomiting. There was a large tumor in the right lower quadrant, immovable, and with a hard irregular surface. A diagnosis of carcinoma of the cecum was made. The true condition, as partly revealed by operation, and more fully by the autopsy two days later, was an extensive inflammation of the sigmoid, with numerous ulcers and diverticula and no less than six perforations from it into an abscess cavity situated in the mesosigmoid. The sigmoid itself was adherent in the right side of the pelvis to the cecum and to the small intestine.

These cases have been cited to show the variations in the clinical picture

[1] Annals of Surgery, 1907, vol. xlvi, p. 148.
[2] Archiv f. klin. Chirurgie, 1900, vol. lxi, p. 866.

according to the seat and severity of the disease. They by no means exhaust the subject, although they are fairly common types. When many more cases have been reported, a clearer diagnosis can be arrived at, and it is to be hoped that those who see patients suffering from symptoms in this quarter of the abdomen will make and record accurate observations upon the course of the disease.

Like others who have investigated the subject of colitis, Mummery[1] finds that the lesions are most marked in, and are often confined to, the lower part of the sigmoid flexure. He emphasizes the fact that mucous colitis is no more a distinct disease than "diarrhea." The frequent discharge of mucus may be a symptom of a number of conditions.

Constipation is the great antecedent cause, although the patient often dates his illness from the subsequent diarrhea which is usually so prominent a symptom. Bleeding occurred in two-thirds of his cases, both benign and malignant. Mucus was invariably present, and often in great quantities. Frequently casts of the bowel were passed. Loss of weight was common in both classes of cases. It was especially marked in connection with a severe diarrhea. In two cases intestinal sand (phosphate of calcium and ammonium) was passed, with accompanying severe abdominal colic. Enterospasm occurred in one case. The tumor, apparently of the sigmoid, was about two inches long and was present only during attacks of colic. It was thought to be due to an ulcer. The patient entirely recovered as a result of dieting and irrigation.

In two-thirds of Mummery's cases chronic inflammatory lesions could be demonstrated through the sigmoidoscope. In one-fifth of the cases an ulcer was seen.

In 7 cases (one-fifth of all) the colitis was due to cancer above the rectum. Mummery says these cases cannot be distinguished from the symptoms alone. Two patients passed no blood, and a third very little. Two patients passed typical mucous casts. Nor does the age of the patient offer any assistance.

Treatment consists in rest in bed, irrigations in a semiprone position with weak peroxide of hydrogen, or 1 per cent. argyrol, or 1 to 2000 permanganate of potash. In doubtful cases the abdomen should be opened, adhesions freed, a too long meson shortened by stitching, retroflexed uterus supported, etc. Ileosigmoidostomy should rarely be performed, as the exclusion of the large intestine deprives the patient of a useful part of his body.

Mummery[2] divides the inflammatory cases of sigmoiditis into simple, granular, hypertrophic, follicular, and ulcerative, according to the appearance as seen through a sigmoidoscope. He notes the fact that malignant disease may exist without blood in the stools. The patients

[1] Lancet, 1907, vol. ii, p. 1638.
[2] British Medical Journal, 1908, vol. ii, p. 884.

with inflammation of the sigmoid should be treated by rest in bed on a full diet, with plenty of fat, cream, etc., to make the stools soft.

In irrigation the fluid should be passed while the patient is semiprone. The knee-chest position should then be assumed for a few minutes, to allow the fluid to enter the sigmoid. The injection should be retained as long as possible.

At first a simple alkaline solution may be employed, such as bicarbonate of soda, one dram to the pint; later, argyrol, 0.5 per cent., or potassium permanganate, 0.2 per cent.

Cases of so-called chronic colitis often have their seat in the sigmoid. No one should undertake to treat such a case until he has made a careful examination with a sigmoidoscope.

Diverticulitis of the Sigmoid. Mayo[1] proposes the name of acquired diverticulitis of the large intestine for those inflammations of the descending colon and sigmoid flexure which have their origin primarily in the arrest of the fecal stream in this portion of the bowel. The cases are conveniently grouped in three classes, according to the development of the symptoms. The bowel wall may perforate and an abscess may form outside of it, either in the peritoneal cavity or behind the peritoneum; or thickening and contraction of the wall of the colon may cause obstruction, acute or chronic; or the symptoms may be mild and disappear spontaneously. A number of cases are reported. Pathological examination of the resected portions of the intestine showed that there were usually small multiple diverticula of the false variety. There were herniæ of the mucous membrane of the sigmoid, passing through deficiencies of the circular muscular fibers, into the subserous tissue. Whether the condition was congenital or acquired, the pathologist was unable to state. Inflammatory deposits were marked, due doubtless to leakage through the walls of the diverticula.

· A diagnosis of this condition made in its early stages, and before obstruction or perforation has set in, is extremely difficult. Nearly all of the patients were over forty years of age; about half of them had a demonstrable tumor in the left lower abdominal quadrant, with considerable tenderness; and nearly all gave a history of attacks of abdominal pain, general at first, and then becoming localized in the left iliac region.

Examination for Intestinal Tumor. Okinczyg[2] examines the abdomen for tumor of the large intestine with the pelvis high, the patient lying at an angle of 45 degrees. This position eliminates the downward thrust of the diaphragm. Alternating diarrhea and constipation, or diarrhea alone, are important symptoms. Pain is likewise an early symptom. It may start at the tumor and spread till it involves the whole large intestine. At other times it is noticed last in the vicinity of the tumor. Examination under an anesthetic is important. Meteorism

[1] Surgery, Gynecology, and Obstetrics, 1907, vol. v, p. 8.
[2] Zentralblatt f. Chirurgie, 1907, p. 1455.

produced by the tumor may disappear when the patient is chloroformed. The tumor itself feels larger or smaller at different examinations, possibly because more or less of the neighboring bowel is in a state of tetanic contraction.

Cancer of the Sigmoid. Early Diagnosis. The early symptoms of carcinoma of the sigmoid are less striking than those of benign inflammation, and are apt to be overlooked by the physician. Constipation is the most marked symptom, requiring constantly increased doses of cathartics to overcome it. This constipation is so disposed as to time that one may well speak of acute attacks of constipation in these cases. That is to say, the movements of the bowels will become scanty and infrequent, and perhaps cease for three or four days. Then as a result of cathartics, or enemata, there will be several movements—the last perhaps loose; and then for one or more weeks the bowels will act satisfactorily; after that another attack of constipation comes on. Inquiry will almost always show that these attacks tend to occur at shorter intervals, and that stronger medicines are required to overcome them. There is pain in the left lower quadrant of the abdomen, which is usually slight until the tumor begins to interfere with the fecal current. The pain is then of a griping type, and there may be visible peristalsis. There is a slight but steady loss of weight. Such loss and the development of cachexia become more apparent later, but they should be looked for, and be given due consideration in early suspected cases.

Whether a tumor can be palpated will depend not only on the thickness of the abdominal wall, but also on the situation of the tumor and its size. If the patient is stout, or if the tumor is situated in the lower part or the sigmoid, it may be inaccessible to palpation. If it can be reached with the finger inserted into the rectum, it is situated in the rectum and not in the sigmoid.

When a malignant tumor of the sigmoid is small, it is often movable. By the time it reaches a considerable size, attachments will prevent its motion. Hence a large movable tumor is usually benign. Examination with an endoscopic tube, not less than twelve inches long, should always be performed, although in obstructive cases it usually yields negative results. Air or water pumped into the rectum may be heard to gurgle past the stricture.

If the patient is seen in an attack of acute constipation, the abdomen is distended with gas, so that palpation is largely negative. There may be visible peristalsis. There may be such an accumulation of fecal matter above the constriction that there is a large area of dulness in the left lower quadrant of the abdomen. Water or air injected into the rectum will probably not pass the constriction, so that not more than a pint of water can be received. If the obstruction becomes complete, the symptoms of ileus will develop.

Cases illustrating the differential diagnosis between benign and malig-

nant stricture of the colon are also reported by Monsarrat, of Liverpool, Cushing,[1] Pringle,[2] Mummery,[3] Jonas,[4] and others.

Niles[5] lays stress upon the importance of angulation of the sigmoid as a predisposing cause of ulcer. He gives as symptoms left-sided tenderness, distention of the colon, colicky pain, obstinate constipation, and pus or blood in the stools. Examination should be made both before and after the large intestine has been distended by air or water.

Hemmeter[6] does not believe that, in the present state of our knowledge, an early diagnosis of carcinoma of the large intestine is possible. He is influenced in this view by the fact that in 36 cases of carcinoma of the colon coming under his observation, the clinical history showed a record of intestinal disease of two years' duration in 14 cases; of chronic colitis of four years' duration in 2 cases; symptoms of obstruction had existed for more than six years in 2 cases, while in 3 cases, symptoms of obstinate constipation and some pain had existed for at least seven years. In the remaining 15 cases, no symptoms were elicited which were sufficient to indicate the beginning of the disease.

Anshütz,[7] who made a careful study of all the operative cases of carcinoma of the large intestine above the rectum occurring in the Breslau Clinic in fifteen years, found that ileus was a symptom in 40 per cent. of the cases.

In the 128 patients treated the situation of the tumor was as follows: Cecum, 24; ascending colon, 10; hepatic flexure, 9; transverse colon, 15; splenic flexure, 17; descending colon, 4; sigmoid flexure, 49, or almost 40 per cent. of the whole.

The average period of discomfort previous to operation was, in the cases of sigmoid tumors, eleven months. De Bovis, who also investigated this point, found an average period of discomfort of a little less than nine months.

Every malignant tumor, and especially such as are concealed from sight, has an early period of growth during which it gives no symptoms. This latent period is of the greatest importance to the surgeon, whose success in removal of the malignant tumor depends in large measure on an early diagnosis.

Boas, in writing upon this subject recently, takes a very gloomy view of the possibilities of early diagnosis when he says, "The period in which a really early diagnosis might be of service lies beyond the limits of our recognition." Every one who has seen many operations for carcinoma has surely experienced this same feeling of "too late." But

[1] Annals of Surgery, August, 1906.
[2] Medical Press and Circular, 1907, vol. lxxxiv, p. 56.
[3] British Medical Journal, 1905, vol. ii, p. 1630.
[4] Journal American Medical Association, 1906, vol. xlvii, p. 825.
[5] Ibid., p. 832.   [6] Medical Record, 1907, vo . lxxii, p. 801.
[7] Mitt. a. d. Grenzgeb. Med. u. Chir., 1907; Gedenkband f. Mikulicz, p. 488.

to look upon all cases of carcinoma of the intestine with such a view is too pessimistic. Surely, in all cases in which a radical removal of the tumor is still a possibility the diagnosis has been made sufficiently early to be of service.

It must be admitted, on the other hand, that some such tumors grow to an inoperable condition in the latent period, but they are certainly the exceptions.

What, then, are the earliest recognizable symptoms? First of all, one should form a correct habit of looking at the question. Given any symptoms referable to the intestine, can carcinoma be excluded? If not, is an exploratory laparotomy indicated? Will the risk to the patient of this diagnostic measure be as great as that from allowing a possible carcinoma to become inoperable? Furthermore, by an exploration alone in many cases can the question of radical operation be decided. The time during which symptoms have existed is no criterion. Thus, in Anschütz's whole list of patients 50 per cent. were in a condition in which the tumor was too advanced for radical removal. While if all his cases were divided into two groups—those who had symptoms for less than six months, and those who had symptoms for more than this period—it so happened that the percentage of inoperable cases was slightly less among those who had had symptoms the longer time. Statistics by other writers have shown about the same percentages. If half of the patients are still operable, even when six months to a year have passed from the time of the first symptoms, how much better the chance for these patients if they all came to operation within three months from the initial symptoms.

The first symptoms are almost invariably disturbances of digestion —not well localized. Next the attention becomes fixed on the irregular action of the large intestine. Usually there is constipation, less often diarrhea, still less often an alternating diarrhea and constipation. In only 3 of Anschütz's 128 patients was bleeding from the anus noted as a very early symptom, and in more than four-fifths it did not occur at all. In 6 patients the first symptoms were gastric. This is more likely to be the case in carcinoma of the transverse colon or of the splenic flexure. We thus see that early warnings exist in most cases. Usually the symptoms last for a time and then subside, to the relief of the patient, who thinks the cause of his discomfort was only a temporary one. Too often this relief is shared by the physician who, if he has considered carcinoma at all, hesitates to disturb the mind of his patient by mentioning it, or by making examinations sufficiently thorough to exclude it. And so the matter rests till another attack comes on.

The palpation of a tumor is one of the surest signs of its existence. It could be made out positively in half of the cases we are considering, and there was an indefinite sense of resistance in half of the remainder. Of almost equal significance is a local increased peristalsis, which

Anschütz found in nearly one-half of his patients.   Frequently there was a distinct rigidity of the portion of the colon immediately proximal to the tumor.

Pain was an early symptom in three-quarters of the cases, and usually it was fairly well localized.   It ought always to suggest a thorough examination.   A single palpation of the abdomen with negative result is of no significance.   A concealed position of the tumor may prevent its palpation, or it may not be felt simply because the intestines are not properly emptied.   Digital rectal examination and endoscopic examination are equally necessary.   If the physician who is consulted has not the time to make repeated, careful examinations, he should call upon some one to do it for him.

It is noteworthy that in about one-fourth of the cases of carcinoma of the colon, the doctor is first summoned on account of a sudden sharp attack of pain, resembling an attack of appendicitis.   In a number of cases this mistake in diagnosis has been made and operation performed.   Or there may be an early attack of stenosis, although usually not a complete ileus.   It is recognized by the patient as an attack of colic.   Diarrhea when it exists is due to an accompanying catarrhal colitis, the result of accumulations of feces above the stenosis.   As ulcerative colitis of a non-malignant character is often accompanied by loss in weight and local tenderness, diagnosis in cases accompanied by diarrhea is particularly difficult.   Tenesmus, if it exists, is an indication that the tumor is low down in the sigmoid flexure—provided that it is not palpable through the anus.   Loss of weight is dependent in large measure on the condition of digestion.   A carcinoma of the colon may exist for a considerable time without it.   The same is true of cachexia.

During 1906, in the Heidelberg Clinic, resection for carcinoma of the sigmoid was performed upon 8 patients; 2 died.   In one case the patient went out with a fistula.   The remaining five were discharged in good condition without any fistula, the bowels acting normally.

THE RECTUM.

Inflammatory Stricture.   When irrigations and the passage of rectal bougies fail to cure an inflammatory stricture of the rectum, operation is indicated.   This may be either a division of the stricture—proctotomy, or its excision, or a colostomy.   A simple division of the stricture is only permissible in case the stricture is situated above the sphincter, as the division of this muscle under such unfavorable conditions almost always leaves the patient incontinent.   Moreover, a simple division of a stricture higher placed, seldom affords more than a temporary benefit.   There is little uniformity of opinion on the question as to whether

excision of the stricture is a better procedure than colostomy. One thing is certain—resection of an inflammatory stricture of the rectum is technically much more difficult than the same operation performed for carcinoma.

Hitherto colostomy has seldom been followed by a cure of the stricture, and hence the artificial anus has been a life-long burden. There seems to be no good reason why many such patients should not be entirely cured if intelligent persistent treatment is directed to this end. As the colostomy frees the strictured rectum from constant irritation of the fecal mass, the conditions for cure are very different from those existing before the colostomy is established. Hence failure of treatment by bougies and irrigations before the artificial anus is established is no reason for not carrying out similar postoperative treatment. Such treatment has been carried out in the Surgical Clinic of Vienna a number of times. Clairmont[1] reports in detail six cases, with more or less success. A lateral colostomy was made as near the stricture as possible. Every day the lower bowel was irrigated with 3 per cent. boric acid, or 1 to 1000 (more or less) silver nitrate, or one of the newer silver salts, or 1 to 1000 permanganate of potash, or 1 per cent. tannic acid.

A string was passed through the stricture from above downward, either by irrigation, or by utilizing the fecal stream, the patient taking castor oil, while the artificial anus was tightly strapped. In one case it was necessary to divide the stricture from below, in order to pass the string. Usually several efforts were necessary to bring the string through. When in place, a second string is attached and pulled through, and left in place as a safeguard in case the first one breaks. By means of the string a conical rubber cord about six feet long, and measuring nearly an inch (2 cm.) at its large end, was daily dragged through the stricture. Under this treatment, combined with irrigation, dilatation of the stricture was invariably produced, and existing ulceration was benefited. Later, bougies were passed from the anus, first by the doctor and then by the patient.

A review of the reported cases shows that such treatment is capable of great good, but to effect a complete cure it must be carried out for a long time. The artificial anus will then close of itself, or may be sutured. In one case too urgent efforts at dilatation produced a periproctal abscess. The passage of the dilating bougie in the direction of the normal peristalsis is more beneficial than the passage of bougies per rectum.

Gradual Anal Dilatation. Roberts[2] has found that a dilatable bag similar to that used to dilate the cervix uteri is the best form of apparatus to accomplish gradual dilatation of the anus. With the wedge-shaped dilator in common use, the force operates chiefly upward, instead of

[1] Arch. f. klin. Chir., 1907, vol. lxxxiv, p. 180
[2] Medical Record, 1907, vol. lxxii, p. 985

outward, causing unnecessary pain; whereas, expanding metal dilators are even more painful. The instrument is equally serviceable in dilatation of stricture of the rectum, for which purpose it is introduced through a speculum.

The apparatus consists of an inner bag of rubberized cloth, the ends made bulbous to prevent slipping inward or outward when distended. To this bag is attached a tube of like material, on the end of which is fastened a small stopcock; a hand bulb valved to prevent the backward passage of air is attached to the stopcock. Within the bag, and extending through a portion of the tube, is a slender metal rod with bulbous ends; this is a simple means of giving the collapsed bag sufficient rigidity during introduction. Outside the strong dilating bag is a thin, elastic cover, free from seams, which gives a perfect smoothness to the bag at all stages of dilatation. The seams and wrinkles of the inner bag are not perceptible through this cover.

Complete Prolapse of the Rectum. The more one studies the question of prolapse of the rectum, the more evident it is that a prolapse is essentially a hernia in the manner of its occurrence. This is best seen in the more advanced cases of prolapse, in which there will be found a stretched and relaxed peritoneum in Douglas' space, a disorganization of the perineum and weakening of the anal ring, as well as a weakening of the lower portion of the rectum and its lateral attachments. Whoever will obtain more than a temporary success in the treatment of these cases must recognize and overcome these various factors in their occurrence. In the history of inguinal hernia general success did not follow operations until they accomplished the obliteration of the distended peritoneal sac and strengthened the weakened abdominal wall; just so in the case of prolapse, these two ends must be gained if a permanent cure is to be obtained. At present no one operation has been devised which meets the requirements of rectal prolapse as fully as Bassini's operation meets the requirements for an inguinal hernia. It is therefore necessary to combine with a colopexy closure of Douglas' space, and then to repair the distended perineum. The function of the lateral attachments of the rectum must be recognized by every one who has attempted to bring the rectum down after resecting a portion of it. It is quite impossible to do so until these lateral attachments have been severed; hence they must be thoroughly stretched before a prolapse is possible. It naturally follows, if they can be restored the prolapse will be cured. This is the theory of a colopexy, but the new attachments will stretch like the original ones if they are left to bear the whole strain of the varying intra-abdominal pressure.

The closure of Douglas' space as a means of curing a prolapse was first carried out by Samter,[1] in 1902. His plan was to obliterate Douglas'

[1] Mitt. a. d. Grenz. der Med. und Chir., 1907, Bedent bd. f. Mikulicz, p. 65.

pouch by an anteroposterior suture as well as a transverse one, combining this with colopexy. With this operation may be combined anterior rectoperineorrhaphy. While these operations aim at the seat of the trouble, they may not entirely prevent prolapse of greatly distended mucous membrane; hence in certain cases resection will be indicated. This should, however, not be performed until the effect of the other operations is clearly shown. The perineal operation is performed by making an incision anterior to the anus, exposing the sphincter and levator
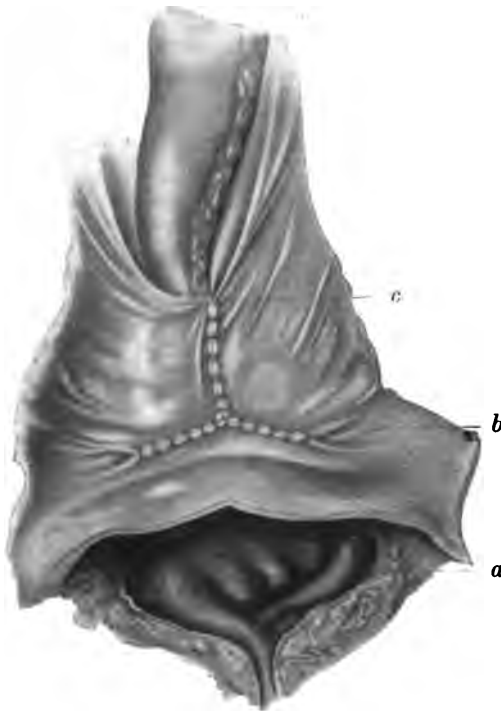
Fig. 40.—Closure of Douglas' space by sutures, Samter's method: *a*, bladder laid open; *b*, transverse suture; *c*, anterior posterior suture of the peritoneum. This hides a still deeper suture by which Douglas' pouch is attached to the colon.

ani muscles, suturing them together from side to side so as to increase the length of the median raphé and then closing the wound in the skin by a suture line placed anteroposteriorly. In some cases this external operation may suffice to effect a cure; in the severer cases the intraperitoneal sutures are also required (Fig. 40).

OPERATIONS FOR PROLAPSE. Lenormant[1] compares the different methods of operating for prolapse of the rectum, arriving at the conclusion that colopexy has certain points of advantage, especially when supple-

[1] Rev. de Chir., 1907, vol. xxxv, pp. 191 and 443.

mented by the restoration of the peritoneum.   The following table gives
at a glance the immediate and late results:

Operation.	Cases.	Per cent. of mortality.	Per cent. of recurrence.	Per cent. of cures in one year or later.
1. Simple colopexy	102	....	26.4	30.8
2. Colopexotomy	5	....	20.0	60.0
3. Resection of the prolapse . . .	110	10.9	8.0	12.7
4. Resection of the mucous membrane	25	8.0	....	56.0
5. Rectopexy	54	....	18.5	24.0

The mortality following the resection of the prolapsed bowel is suffi-
cient to condemn it, even though its ultimate results were as good as
one of the other operations, rectopexy or colopexy.   It should, therefore,
be reserved for cases of irreducible prolapse.   Resection of the mucous
membrane alone has also considerable mortality, and is followed in some
cases by formation of stricture in case the stitches pull out and the
mucous membrane retracts.

Various methods have been devised for the performance of rectopexy.
Verneuil fastened it to the edges of an incision between the anus and
coccyx.   Marchant folded in the posterior wall of the rectum and sus-
pended it to the sacro-sciatic ligaments.   Duval and Lenormant fold
the anterior portion of the rectum and suture the levators of the anus
in addition to the suspension of the rectum itself.   Rectopexy thus carried
out restores the parts to approximately a normal condition, and is the
operation of choice providing the prolapse does not exceed three or four
inches in length.   If the prolapse is greater than this, colopexy is pref-
erable.   When it is performed the restoration of the perineum should
not be neglected, else recurrence is likely to take place.   This can best
be carried out through an incision anterior to the anus.

BURSTING A PROLAPSED RECTUM.   That a prolapsed rectum may
be ruptured by a sudden abdominal strain has been known for many
years, although instances of this occurrence are few and far between.
Heineke[1] who made a collection of twelve published cases, and reported
them with one of his own, has recently seen another instance of this lesion,[2]
and discusses the mechanical factors which underlie it.   Usually there
is a prolapse of some years' duration, which ruptures during defecation
or while the individual is carrying a heavy burden.   The small intestine
often prolapses through the rent in the rectal wall.   It may or may not
protrude beyond the prolapsed rectum.   When the pressure is with-
drawn the bowel may so far retract that the site of the rupture is no
longer apparent, as it lies within the anus.   Most of the reported rup-
tures have occurred in women.   Experiments upon a female cadaver
with rectal prolapse showed what strong pressure must be necessary to
cause rupture of the prolapsed rectal wall.   In no instance was Heineke

[1] Beiträge zur klinischen Chirurgie, 1906, vol. l, p. 473.
[2] Münch. med. Woch., 1907, p. 1630.

able to push his fist through the peritoneum and rectal wall, even though he exerted great pressure. He was only able to tear it when he made a boring motion with the point of his finger.

New Methods of Resecting the Rectum. Mummery[1] brings forward a method for removing the whole rectum and neighboring lymphatic area through a median perineal incision. The advantages of this operation are said to be (1) the removal en masse of the entire rectum and tumor, cellular tissue, and lymphatics; (2) the possibility of preserving asepsis during and after the operation; (3) the restoration of the normal opening of the bowel in cases in which it is not necessary to remove
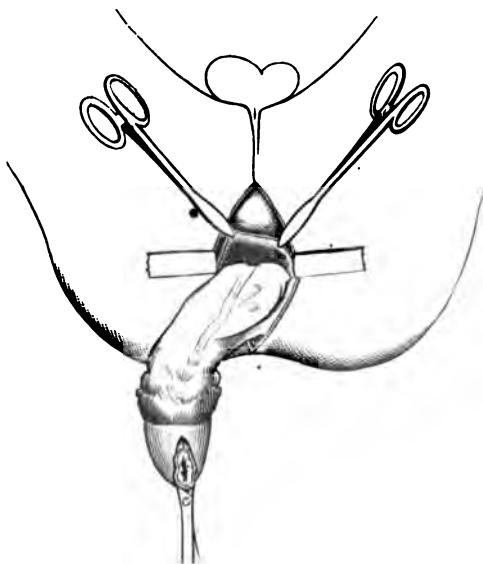
FIG. 41.—Removal of the rectum and a portion of the sigmoid. The clamps are on the anterior part of the divided peritoneum. (Mummery.)

the sphincters; (4) the method is an improvement upon the Kraske method, inasmuch as the sacrum is not injured; (5) the sigmoid is brought down and stitched to the skin, and this is an improvement upon the utilization of the stump of the rectum.

The essential steps in the operation are as follows: Dissection of a cuff of mucous membrane for about two inches, as in Whitehead's operation. The lower end of this cuff is clamped and its cut edges touched with pure carbolic. The instruments hitherto employed are laid aside and the gloves are changed; the incision is carried backward, dividing the sphincters to beyond the base of the coccyx, which is removed. The rectum, glands, and tissues are peeled off the sacrum with the finger; the levator ani on each side is pulled down and divided

[1] British Medical Journal, 1907, vol. i, p. 1289.

close to the rectum. Next, the rectum is separated from the prostate and urethra, or from the vagina. This is the most difficult step in the operation. When the peritoneum in front of the rectum is reached, it is divided. Then the peritoneum on each side of the rectum is divided
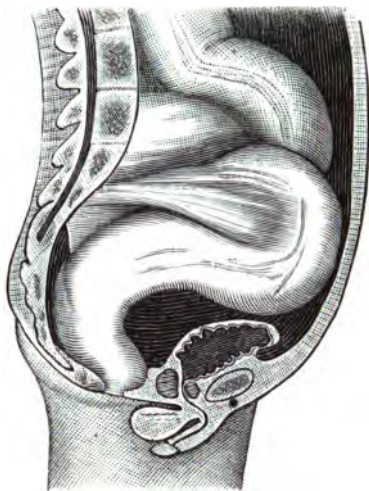

FIG. 42.—Diagram to show the importance of dividing the mesosigmoid for some distance. (Mummery.)

close to the rectum to avoid the ureters. The rectum may thus be brought down several inches, being held only by the mesorectum. This is clamped and divided, and this process continued until a portion of the sigmoid is reached with a meson sufficiently long to permit the
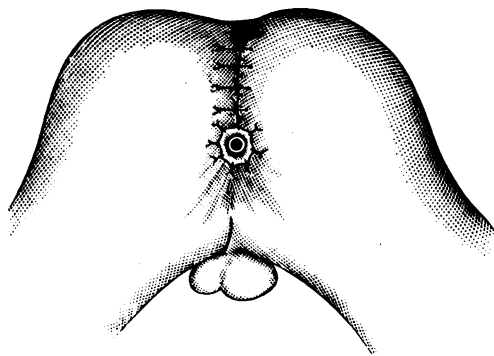
FIG. 43.—Removal of rectum: the operation completed. (Mummery.)

bowel to be brought out of the anus. Vessels are ligated, and the peritoneum is stitched to the sides and front of the sigmoid. Gauze drainage is employed in the upper portion of the wound; elsewhere the wound is closed by sutures. The sigmoid is brought through the perineal

wound until it projects about three-fourths of an inch from the sphincters, and the edges are stitched to the skin, overlapping the edge of the skin in every direction about one-half inch in order to lessen the risk of infection of the wound. If surplus mucous membrane remains as a result of this, it is snipped off with scissors a week later.

Figs. 41, 42, and 43 sufficiently indicate the steps in the operation.

Mummery admits that this operation is not an easy one, and requires a thorough knowledge of the anatomy of the rectum and posterior part of the pelvis. He advises its practice upon the dead before it is attempted upon the living.

Cancer of the Rectum. Goullioud[1] has resected the rectum and pelvic colon twelve times for cancer of the rectum, with only one death. He attacks the growth from the peritoneal cavity, as well as from below, and suggests a modification of the usual abdominoperineal method. After establishing a permanent artificial anus in the left groin, he does not resect all of the sigmoid below this point, but preserves so much of it as may be healthy in order to form a peritoneal pelvic floor. His one fatality was due to intestinal obstruction, caused by adhesions of a loop of intestine to the gauze packing in the pelvis. This would have been avoided, he thinks, by the preservation of the lower portion of the sigmoid. This fact is worth keeping in mind in suitable cases.

THE LIVER AND BILE DUCTS.

Control of Hemorrhage from the Liver. A new form of suture to control hemorrhage from the liver has been devised and used by Knott.[2] It is of plain catgut, and may therefore be left in place to be absorbed. It is passed with a blunt needle and is secured at either end by tying it around a small skein of catgut (Fig. 44). It in no wise interferes with the insertion of any other sutures which may be needed to close a wound, either traumatic or operative, as the case may be, as, for example, after resection of a tumor (Fig. 45).

Stopping the Flow of Bile. Gangitano[3] has been able to arrest an excessive and prolonged flow of bile by adrenalin. In the case reported by him the flow followed operation for echinococcal cysts. He washed out the cavity and injected a 1 to 10,000 solution, and then plugged the cavity with gauze soaked in a 1 to 1000 solution. The application was repeated five times in a week, and by that time the excessive flow was entirely checked.

Gallstones without Symptoms. Can gallstones exist for a long time without symptoms? It is generally assumed that they can do so, since

---

[1] Rev. de Chir., 1907, vol. xxxvi, p. 607.
[2] Annals of Surgery, 1907, vol. xlvi, p. 790.
[3] Riforma Medica, February 2, 1907.

they are often found at autopsy, although not suspected before death. Moynihan[1] says that this is one of those legacies of error which have been
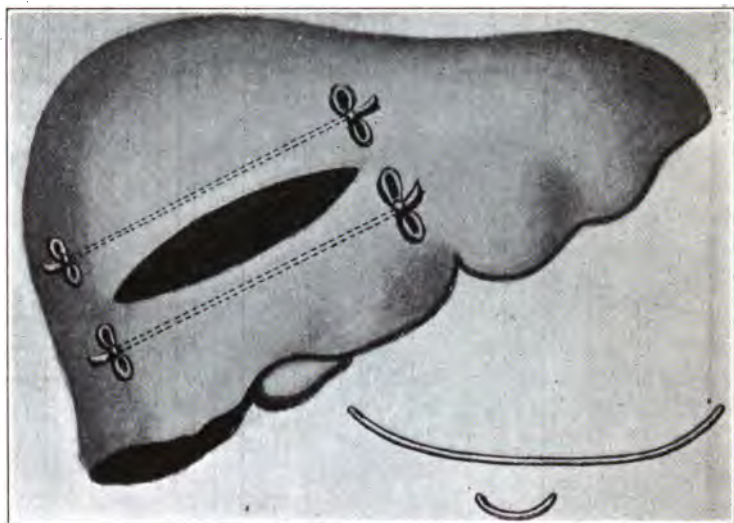

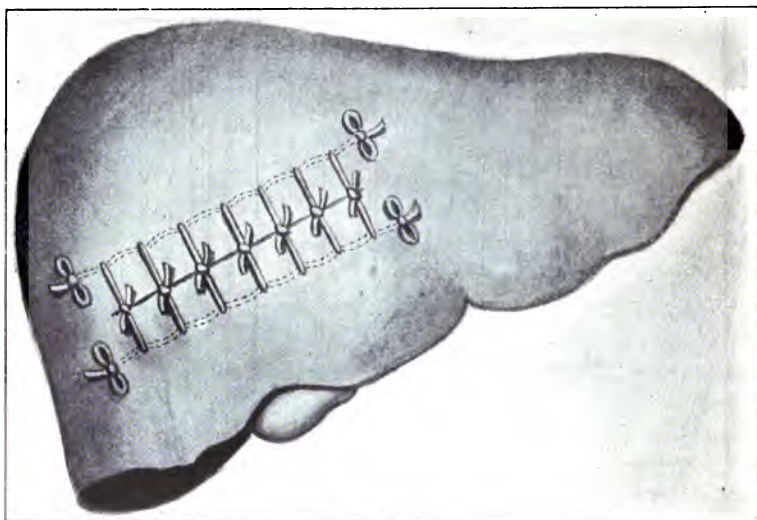Fɪɢ. 44.—Knott's sunken catgut stitch, to control hemorrhage of the liver.

Fɪɢ. 45.—Knott's sunken catgut suture of the liver, with transverse sutures inserted and tied.

bequeathed to us in the days when none but the dead could disclose the secrets of pathology, and which have since been handed down

[1] British Medical Journal, 1907. vol. ii, p. 1381.

reverently from one generation to another. The truth is rather that these inaugural symptoms which are caused by the stones are not generally recognized. Whenever the gallstones are discovered accidentally during the performance of a laparotomy, a history of symptoms attributed to them can usually be obtained, so when an autopsy discloses gallstones, it is assumed, with no reason, that because jaundice or other positive symptoms are not recorded the stones have done nothing to excite recognition; whereas it is quite certain that they frequently, if not constantly, cause symptoms which we are not educated to recognize.

Drainage of the Gall-bladder versus Excision. At the last meeting of the British Medical Association, the pros and cons of excision and simple drainage of the gall-bladder were gone over once more. Bland Sutton began the discussion by stating that 75 per cent. of the diseases of the biliary tract calling for surgical intervention have their origin in the gall-bladder. He therefore recommended excision of the gall-bladder in injury, calculous cholecystitis, acute (non-calculous) cholecystitis, gangrene, perforating ulcer, mucocele (hydrops vesicæ felliæ), chronic suppurative cholecystitis (empyema), biliary fistula, and malignant disease.

He insisted that drainage can be more satisfactorily carried out after excision of the gall-bladder than through it. Few of those who heard Bland Sutton's remarks were willing to record themselves as agreeing with all of them. Mayland was unwilling to admit that the gall-bladder has no useful function to perform, and did not therefore feel justified in removing it in simple cases of calculus. He thought the scar after cholecystectomy was weaker than after cholecystostomy.

Symonds objected to routine cholecystectomy on account of its rather higher mortality. Newboldt took the same view.

Bishop wished the gall-bladder retained so that one may drain through it. Moreover, if obstruction of the common duct exists one may utilize the gall-bladder for anastomosis. He, therefore, prefers cholecystostomy to removal of the gall-bladder in cases of calculus, in acute cholecystitis, for in these cases the inflammation invariably extends beyond the gall-bladder, and in biliary fistula.

Malcolm said that the possibility of recurrence of gallstones after cholecystostomy is so small that it may be neglected.

Cousins remarked that it was often impossible to decide upon the form of treatment until the abdomen was opened. In some cases partial excision was satisfactory.

Cameron said that Bland Sutton was trying to establish a method of procedure that Lawson Tait had tried to establish many years previously, but without success. He looked upon the gall-bladder as a nocturnal reservoir, and said those who have it sleep better than those who do not. He also mentioned a case in which a patient was fed for a number of days through an artificial biliary fistula.

White said that in 158 cholecystostomies, a secondary operation to open the gall-bladder had only twice been necessary.

Drainage of the Hepatic Duct. Infectious diseases of the liver often demand drainage of the hepatic duct. This is not a more complicated surgical procedure than many others, and the good results which have followed its use should lead to its more general adoption.

The hepatic duct may be drained indirectly by a tube passed through the gall-bladder and cystic duct into the hepatic duct. This is often done in cholecystostomy. Another method of indirect drainage is through the common duct, a tube being pushed through an incision in this duct onward into the hepatic duct.

Cumston[1] describes the various methods of direct drainage of the hepatic duct which have been employed since Cabot first undertook it in 1892. The hepatic duct is deeply placed so that it is important that the patient should lie upon a hard, round cushion placed transversely in the dorsolumbar region. When the abdomen has been opened the gall-bladder and cystic duct are the guides to the foramen of Winslow. If this is open one finger is passed through it, and the gastrohepatic omentum is drawn forward, so that the hepatic duct which lies in it is easily recognized. In most cases in which hepatic drainage is required the foramen will have been occluded by adhesions. It may be possible to break these up and thus to expose the hepatic duct. If not, the gall-bladder should be opened down to the cystic duct, and a small catheter passed through the cystic duct and into the hepatic duct. When the hepatic duct has been exposed it should be incised, any calculi removed, and if infection is present the duct should be drained. Otherwise, the incision may be closed by suture, provided the drainage of cystic duct or gall-bladder is maintained.

To drain the hepatic duct a small rubber tube is passed into it for a distance of a half inch or more and fastened by fine catgut sutures to the edges of the wound in the duct. The other end of the tube is brought out of the abdominal wound. Narrow strips of gauze placed alongside of the tube will protect the peritoneal cavity from any bile which may escape, but if the tube chosen for drainage is of suitable size there will be no leakage around the tube and all the bile will flow through it. The strips of gauze should be removed in forty-eight hours. The tube used for drainage should be a long one without lateral openings and the outer end of it should be immersed in a recepticle containing some antiseptic fluid so that a real siphon is formed, or the outer end of the tube may be placed in dressings which are changed as often as they become saturated. If the bile is thick and does not flow readily, irrigation should be employed. In most cases the tube may be removed at the end of a week.

Hepatic drainage is a valuable resource in septic cases, since it elimi-

---

[1] Journal of the American Medical Association, 1907, vol. xlviii, p. 1171.

nates from the body all of the infectious material, which would otherwise pass into the small intestine. The hepatic drainage should not be continued too long, lest the patient suffer from the diversion of the total stream of bile.

Posterior Cholecystenterostomy. Brentano[1] advocates a posterior method of cholecystenterostomy in cases in which it is necessary to attach the gall-bladder to the small intestine. This is a rational position to take, since the advantages of the method are essentially the same as those of a posterior gastro-enterostomy. The omentum and transverse colon are turned upward; a slit is made in the transverse mesocolon, a loop of jejunum is passed through this slit and anastomosed to the surface of the gall-bladder. This intestinal loop is then withdrawn and the gall-bladder stitched to the mesocolon. This operation interferes much less with the peristaltic action of the intestine than does the usual anastomosis made in front of the colon.

THE PANCREAS.

Rupture of Pancreas. The determination of rupture of the pancreas after blunt abdominal injuries is always a difficult one. The injury to the pancreas being usually associated with injury to other organs, the exact diagnosis is usually impossible until the abdomen has been opened. In almost every case which has been reported the patient has complained of intense pain immediately after the injury, or as soon as the first shock has passed. This may be due to the stretching of the tissues with blood, or possibly to irritation of the posterior peritoneum by the escaping pancreatic fluid. Similarly after rupture or perforation of the stomach or intestine, the escape of contained fluid may cause painful irritation of the posterior peritoneum.

A typical case of rupture of the pancreas without complications is described by Heineke.[2] A man aged thirty-four years was struck by masses of falling earth, chiefly on the chest and upper abdomen. At first he could not breathe; then he was able to dig his way out. There was no vomiting, but intense and increasing pain in the epigastrium and under both costal margins. No free fluid was found after two hours in either pleural cavity or in the peritoneal cavity. The pulse was good. The abdominal muscles were firmly contracted. As this muscular rigidity and pain increased, and vomiting set in, the abdomen was opened above the umbilicus, four hours after injury. The liver and spleen and stomach were intact. After considerable search a rent was found in the gastrohepatic omentum, and back of this a complete division of the pancreas into two pieces. The plane of division was sagittal, and

---

[1] Zentralbl. f. Chir., 1907, p. 682.
[2] Arch. f. klin. Chir., 1907, vol. lxxxiv, p. 1112.

directly in front of the spinal column. There was moderate hemorrhage, but no fat necrosis. The larger vessels were ligated, and oozing stopped by suture together of the two portions of the pancreas by means of six through-and-through catgut sutures. A drain was introduced through the gastrocolic ligament, and the rent in the gastrohepatic ligament was sutured. The patient made a good recovery, although a fistula persisted for many weeks.

There is another symptom which is almost pathognomonic of rupture of the pancreas whenever it occurs, and that is a collection of blood in the lesser peritoneal cavity. In the case cited, the gastrohepatic ligament was ruptured and the blood readily escaped to the greater peritoneal cavity. In many cases the ligament remains intact, and if the foramen ovale is closed, the blood will collect and give the same clinical symptoms as a pancreatic cyst. The rupture may be situated in any part of the pancreas.

The escape of pancreatic fluid in these cases has very rarely produced fat necrosis. Truhart collected 138 cases of rupture, and in only 17 of them was there any fat necrosis. This fact has not been satisfactorily explained as yet. Polya[1] suggests the theory that pancreatic juice is not destructive to living tissue unless it is mixed with intestinal juice. Mikulicz has added the suggestion that the juice from the crushed tissues of the pancreas may, in some cases, be sufficient to make their pancreatic secretion destructive. The subject requires further study.

The treatment after rupture of the pancreas is immediately an operative one. The rupture may be tamponed or sutured. The latter procedure possesses the advantage that possibly the divided duct may be so well approximated that the wound will heal without a fistula. But this has not yet been attained in any of the sutured cases so far as is known. Neither is it as yet determined whether any reëstablishment of divided ducts takes place. If not, and the distal portion of the pancreas must remain functionally useless, it might be better to remove it at the first operation, and so eliminate the long persistence of a fistula. There is, however, the possibility of an internal secretion to be considered.

If the patient is not operated upon he may die from hemorrhage, or from peritonitis. If the injury is a slight one, complete recovery may follow, or a traumatic cyst may develop, provided the foramen of Winslow is closed and the gastric ligaments are not ruptured. Such was found in a patient of Heineke, seven days after a wheel injury of the abdomen. A fluctuating tumor occupied a little more than the upper left quadrant of the abdomen. The percussion note was tympanitic all over the tumor. This was due to the fact that the stomach was flattened out over the surface of the tumor. The latter was due to a distention of the lesser peritoneal cavity with over a quart of a bloody

---

[1] Berl. klin. Wochenschrift, 1906, p. 1562.

fluid containing diastase and steapsin and possibly trypsin. The cavity was drained, and the patient recovered.

In the after-treatment of these patients it has been found that a fistula is more likely to close if carbohydrates are excluded from the diet. The effect of this is at once manifest on the amount of daily secretion, and in some cases a long-standing fistula has closed entirely after such a change was made in the diet.

Diagnosis of acute Pancreatitis. At the last annual meeting of the British Medical Association, Osler read a paper on the diagnosis of acute pancreatitis, which he said afforded one a picture of the severest form of the acute abdominal lesion. The sudden prostration, the pain recurring in paroxysms, and quickly followed by vomiting similar to that of an acute obstruction of the upper part of the small intestine, the intense shock, the diffuse lividity, and the tenderness over the upper part of the abdomen are its chief characteristics. Sometimes a diffuse swelling is appreciable, but this is often obscured by the rapid distention of the abdomen. It must be said that the diagnosis of acute pancreatitis is often impossible. The very same symptoms may be found in an attack of severe hepatic colic, or in acute perforation of the stomach. In the diagnosis the history is of greatest importance, especially one of alcoholism in middle-aged men, or a record of gallstones, and then the sudden severe symptoms. Death occurs, as a rule, in three or four days from the onset. In the suppurative cases the symptoms are not at first so acute; the pain is less urgent, but fever is present, and a swelling may be found between the ensiform and the umbilicus, or extending to the left and reaching to the flank. The urine and stools are characteristic of pancreatic disease. The stools may contain fragments of necrotic pancreas or the typical excess of fat. In reference to prognosis, taking a large series of cases, 90 per cent. of those not operated on have died, and of those operated on, more than 50 per cent. have recovered. The cases in which gallstones are the cause have proved particularly fatal.

Pancreatic Disease and Jaundice. In their excellent book on the *Surgery and Pathology of the Pancreas,* which has just been published, Robson and Cammidge frequently refer to the association of jaundice with pancreatic disease. In 62 per cent. of human subjects examined the common bile duct is either in a deep groove or is entirely embedded in the head of the pancreas. Hence a growth or merely inflammation of the pancreas must compress the common duct and lead to more or less jaundice. In the same per cent. of cases the authors have found bile pigments in the urine in patients having disease of the pancreas. In cancer of the head of the pancreas the jaundice develops slowly and painlessly, until the patient is of a dark slaty hue, the so-called black jaundice.

The relation of the common duct to the head of the pancreas probably also explains the occurrence of so-called catarrhal jaundice in connection with gastroduodenal catarrh, or ailments causing a swelling

of the pancreas, especially in the young. Most of these are cured by medical treatment, but sometimes the disease goes on to true interstitial pancreatitis. The so-called chronic catarrh of the bile ducts giving persistent jaundice is nearly always a case of chronic pancreatitis. A gallstone caught in the duct as it passes through the pancreas causes inflammation of the organ, which will result in the compression of the common bile duct and jaundice long after the stone has passed.

The authors insist on preventive treatment for pancreatitis by removal of the gallstones in their early stages, relief of duodenal catarrh by medical means, and by the cure of duodenal ulcer by gastro-enterostomy if necessary.

Pancreatic Cysts. (Hardouin[1]) Duvot recommends lumbar drainage for pancreatic cysts. When a laparotomy is performed, the cyst brought to the surface, and anterior drainage is established, there often follows a persistent fistula, which not only causes discomfort, but may cause the death of the patient through exhaustion. The persistence of the fistula may be due to imperfect drainage, to infection, or to continuous secretion. The lumbar drainage of the cyst favors the escape of secretion and reduces the risk of injections of iodine which may be made to obliterate the cyst.

Geraud recommends opening the cyst through the lumbar region without anterior laparotomy. This is inadvisable, because the operation is technically more difficult than a laparotomy and the chances for complete removal of the cyst through a lumbar incision are very slight.

Gobell[2] gives the mortality after *extirpation of pancreatic cysts* as 19 per cent. Hence one should hesitate to adopt this method in preference to the slower method of drainage, unless the cyst is freely movable or is of the character of a proliferating cystoma. The usual pancreatic cyst, whether aseptic or infectious, is really a pseudocyst in the lesser peritoneal cavity. It should therefore be treated as an abscess is treated, *i. e.*, by incision and drainage. In the postoperative treatment the diet should be such as is given a diabetic patient, and the cyst should be kept from filling by suction drainage. If it fails to heal, a secondary extirpation may be indicated, as has several times been performed with success.

Gobell reports the case of a cyst favorably situated in the tail of the pancreas, which was fully movable, and was excised. The cut surface of the pancreas was carefully sutured. Even in this comparatively simple case a fistula persisted for two months, finally closing spontaneously.

Pancreatic Abscess. In case of an abscess of the head of the pancreas, inaccessible from the flank, Brewer[3] drained as follows: After incision through the left rectus muscle, the transverse colon was reflected and

---

[1] Rev. de Chir., 1907, vol. xxxv, p. 806.

[2] Zentralblatt f. Chirurgie, 1907, Beilage, p. 79.

[3] Surgery, Gynecology, and Obstetrics, 1807, vol. v, p. 344.

the abscess aspirated. The needle puncture was then enlarged, and a large rubber tube inserted and tightly packed about with thin folded gauze tape. One end of the tube and gauze was fastened by a plain catgut stitch and the other brought out through the lower angle of the wound. The drainage was removed in eight days. Recovery was uneventful.

Pancreatic Calculus in a Dog. McClure[1] examined the pancreas of a dog in which two small calculi of calcium carbonate had occluded the main duct. That portion of the gland distal to the calculi was atrophic, dark, firm, and nodular. The duct was much distended, forming the greater part of the bulk of that portion of the gland distal to the calculi. The dog's metabolism had not been affected, as only a part of the gland was shut off.

THE SPLEEN.

Laceration of the Spleen. Bogart[2] reports a case of laceration of the spleen due to the passage of a truck-wheel over a boy. Operation was contraindicated by the extreme shock, but this was overcome by direct transfusion according to the method of Crile, as described in PROGRESSIVE MEDICINE, December, 1907, p. 135. The patient's pulse dropped from 140 to 110, and increased in force and volume. The spleen was so badly damaged that it was removed. The patient's condition at the close of the operation seemed satisfactory, but he died in less than four hours. Examination showed, in addition, a rupture of the left renal vein.

Etiology of Movable Spleen. Moorhead[3] gives the following factors: (1) Enlargement. This is usual but not necessary. It may also be secondary. (2) Relaxation of the splenic ligaments. This may be a developmental defect existing in common with splanchnoptosis, or it may be an effect of a loosening of the left kidney. (3) Traumatism. The rapid changes in the size of any spleen are likely to arouse the suspicion of an intermittent hydronephrosis.

Splenectomy for Strangulation. Wallace[4] removed a spleen from a twelve-year-old girl, on account of an acute strangulation, due to a twist through 360 degrees. There was a history of previous attacks of abdominal pain, but no immediate cause for the twist could be learned. The vessels had been so completely thrombosed, that when the spleen was torn from its pedicle there was no hemorrhage. The patient recovered and one year later was in perfect health.

[1] Johns Hopkins Hospital Bulletin, 1907, vol. xviii, p. 332.
[2] Annals of Surgery, 1908, vol. xlvii, p. 87.
[3] Transactions Royal Academy of Medicine of Ireland, 1907, vol. xxv, p. 108.
[4] Journal of the American Medical Association, 1907, vol. xlix, p. 1774.

Commenting on a similar case, Kakels[1] discusses the indications for splenectomy under such circumstances. Even if the wandering organ is not acutely strangulated, it should still be operated upon in order to avoid just such a complication. Kakels believes the weight of the organ itself has a far greater influence in bringing about a torsion of its pedicle than has the so-called hemodynamic influence described by Payr.[2] This surgeon demonstrated experimentally that when one vessel in the pedicle is shorter than another the organ may be twisted by the blood pressure.

THE OMENTUM AND MESENTERY.

Torsion of the Omentum. From time to time cases of strangulation of the omentum due to twisting of its pedicle have been reported in medical literature, so that now about 60 such cases are on record and it is possible to classify this lesion and to speak intelligently of its diagnosis and its treatment. The cases may be divided into acute and chronic, but this classification has little value, since almost every acute case is preceded by chronic changes, and conversely almost every chronic case is subject to acute exacerbations. A classification suggested by Richardson[3] is of more value. He divides the cases into those of torsion within a hernial sac (Fig. 46), torsion within the abdomen (Fig. 47), and torsion both in a hernial sac and in the abdomen (Fig. 48). The cases may also be divided into three groups, according as the torsion is about one point (Fig. 46), or about two points (Figs. 47 and 48), or is complex (Fig. 49).

The predisposing causes for torsion of the omentum are the gathering together of the free portion of the omentum into a ball, and secondly, adhesion of the free portion of the omentum to some other abdominal organ or to the abdominal wall.

Inguinal hernia is therefore the great disposing cause. The symptoms which have been noted vary according to the amount of strangulation and the completeness of the same. In the chronic cases strangulation is incomplete, and the only symptom may be slight discomfort or pain, with or without an effusion of serum into the peritoneal cavity. In cases of acute complete strangulation there may be vomiting, pain, and collapse. If the condition is not relieved, gangrene and death may result. In a few cases the presence of the matted ball of omentum has been recognized before the torsion occurred. A correct diagnosis of torsion of the omentum has rarely been made before operation. It has usually been mistaken for intestinal strangulation, appendicitis, or peritonitis.

[1] New York Medical Journal, 1907, vol. lxxxvi, p. 639.
[2] Deutsch. Zeit. f. Chir., 1906, vol. lxxxv, p. 392.
[3] Journal of the American Medical Association, 1907, vol. xlviii, p. 1590.

The treatment indicated in all cases of torsion of the omentum is exposure of the twisted omentum and removal of so much of it as shows the effect of strangulation. In rare cases it may be possible to unroll the twisted omentum and allow it to remain in place.

Now that attention has been directed to this subject, the number of reported cases will probably increase. Operators should note the presence or absence of old adhesions, as well as of hernia, and should state exactly
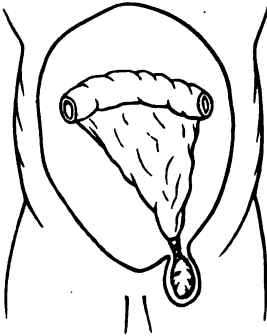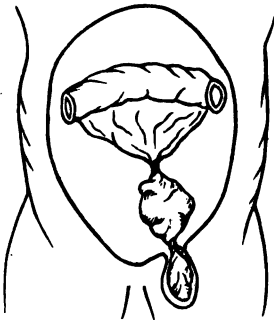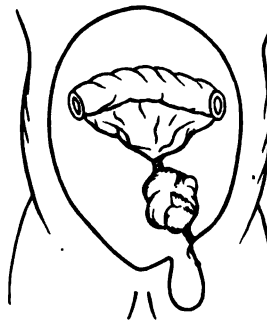

FIG. 46   FIG. 47

FIG. 48   FIG. 49

FIG. 46.—Torsio-omentalis intrahernialis (Richardson).
FIG. 47.—Torsio-omentalis intra-abdominalis (Richardson).
FIG. 48.—Torsio-omentalis intrahernialis et intra-abdominalis (Richardson).
FIG. 49.—Torsio-omentalis complexa (Richardson).

the location of the point of attachment or of torsion. Further knowledge is desired also of the symptoms which precede and accompany an acute attack.

Holes in the Mesentery. Dickenson[1] refers to holes in the mesentery which he believes are due to deficient blood supply and gradual atrophy of the membrane. Such holes are more likely to occur near the cecum.

[1] Journal of the American Medical Association, 1907, vol. xlviii, p. 1267.

He mentions two cases in which the small intestine became strangulated by passing through such abnormal opening.

Cyst of the Mesentery. Vander Veer[1] removed a cyst of the mesentery from an Italian patient aged thirty years. The exact diagnosis was

Fig. 50.—Chyle cyst of the mesentery. (Vander Veer.)

[1] New York State Journal of Medicine, 1907, vol. vii, p. 320.

not made until operation, although the movable tumor had been recognized for some years by the patient. It was situated in the left side and could easily be pushed under the ribs. It was apparently a chyle cyst situated in the mesentery of the ileum. It was removed together with a portion of small intestine about twenty inches in length. The illustration (Fig. 50) shows the relative size of the cyst and intestine. The cut ends of the intestine were united by suture and the patient made a good recovery. This is, of course, the best method of treatment in such cases. The old method of incising and draining the cyst by stitching it in the abdominal wound was frequently followed by a tedious recovery. Of course, if the cyst can be shelled out of its bed and removed without injury to the intestine, this is a much simpler procedure. In Vander Veer's case, as in many others, the cyst was so intimately attached to the wall of the intestine that its separation from the intestine was not practicable.

Solid Tumors in the Inguinal Canal. Peple[1] calls attention to the occurrence of fibromata in the inguinal canal of women. Such tumors were removed from three patients under his observation. All of them were between the ages of nineteen and twenty-six years, and all three had borne one or more children. Two of the tumors sprang from the periosteum or fascia covering the inner face of the ileum. The third was attached merely to the coverings of the canal. All three tumors were probably fibromata, but one of them suggested a sarcoma in its microscopic appearance.

Operations upon the Bloodvessels of the Abdomen. The fear of sepsis, thrombosis, or gangrene has long deterred surgeons from operations upon large venous trunks, but with modern methods of technique these risks have become slight. It is now sufficiently proved that the wall of a large vein may, if wounded, be sutured and the lumen be preserved. It is true that most veins are so supplied with collateral circulation that they can be ligated without fatal results; provided the patient's heart can stand the extra strain required to force the blood through narrower channels, for it takes a little time for the collateral veins to dilate. The portal vein is an exception. If it is ligated suddenly death follows. Sudden ligation of the chief mesenteric vein is almost equally dangerous. A wound in either of the veins should be closed by lateral suture. This treatment should be applied to the inferior vena cava if the wound is situated above the renal veins. If lower down, circular suture may be practised. Monprofit[2] reports six cases of sudden ligation of the inferior vena cava with two deaths. It seems pretty definitely settled that sudden ligation is especially dangerous and should be avoided when possible. For the same reason the

---

[1] Journal of the American Medical Association, 1907, vol. xlviii, p. 872.
[2] Assoc. Franç. de Chirurgie, 1906, p. 23.

vein should not be clamped and left. A temporary elastic ligature may be applied before suture. There are a number of reported cases of successful suture of the inferior cava. In two of these a considerable portion of the wall of the vein was excised (two inches in one case), and still lateral suture was possible, two rows of stitches being employed. Resection and circular suture of a large venous trunk has been practised, not of the inferior cava, but of the femoral. Once it succeeded. In this case,[1] after resection of nearly an inch of the vein, the two ends were sutured together. There was slight leakage for a short time only. No disturbance in the circulation of the leg was observed.

A lateral suture of the portal vein has been practised,[2] and although the patient died in three days the suture of the vein was in good condition, the lumen was preserved and there had been no leakage.

The essentials of a good suture, lateral or circular, are as follows: Compression of the vein above and below with the fingers, or with clamps covered with rubber tubing, or with threads lightly drawn upon; an accurate suture of the wound, the needle passing through all three coats. The delicacy of the venous wall makes a suture of merely the outer two coats impracticable. A round, fine needle should be used, with catgut, silk, or linen thread.

Duret has twice operated for thrombophlebitis occurring in typhoid fever, exposing the vein as far into the abdomen as the thrombosis extended, ligating above and below the infected portion, incising it, evacuating the clots and serum, and dressing the wound. He used bichloride dressings and powdered the wound daily with iodoform. One patient lived a week and died of septicemia; the other recovered. He considers that such treatment serves to prevent embolism and sudden death, and also to prevent infectious products extending by the venous route.

This treatment of a septic thrombus in the iliac vein is analogous to the very successful treatment of thrombosis of the jugular vein and of the lateral sinus in cases of mastoid disease, but the conditions in the abdomen are far different. Owing possibly to a much more rapid absorption through the lymphatics the process does not remain so nearly a local one. It is rather comparable to the septic thrombosis which follows uterine infection, postoperative or postparturient. Reports[3] of 19 such cases treated by ligature or excision of the hypogastric or ovarian or uterine veins show 13 deaths and 6 recoveries.

I am not aware that others than Duret have followed the suggestion of Robineau[4] to ligate the iliac vein or even the inferior cava to stop the spread of the infection. Duret operated upon two patients, once with success, once too late to save the patient. The operation in the former case was as follows: Under chloroform an incision nine or ten inches

---

[1] Kummel, Beit. z. klin. Chir., 1900, vol. xxvi, p. 128.

[2] Schultes, Inaug. Diss., Bonn, 1897.

[3] Assoc. Franç. de Chir., 1906, p. 57.   [4] Ibid., p. 71.

long was made over the iliac and femoral vein. The tissues were swollen, vascular rather than edematous. The lymphatic glands were much swollen. Some of them had to be removed to expose the vein. The sheath of the vein was thickened and distended, and when divided a quantity of reddish, cloudy serum escaped, showing that a periphlebitis existed. After ligation of the femoral, the iliac was ligated above the thrombus, but the intervening vein was not opened.

Sweet[1] also advises the use of three tension stitches in suture of an artery or vein, thus making triangles of the open ends of the vessels. Great care should be employed in clamping the vessel, so that the inner coat may not be injured. Loose connective tissue must also be
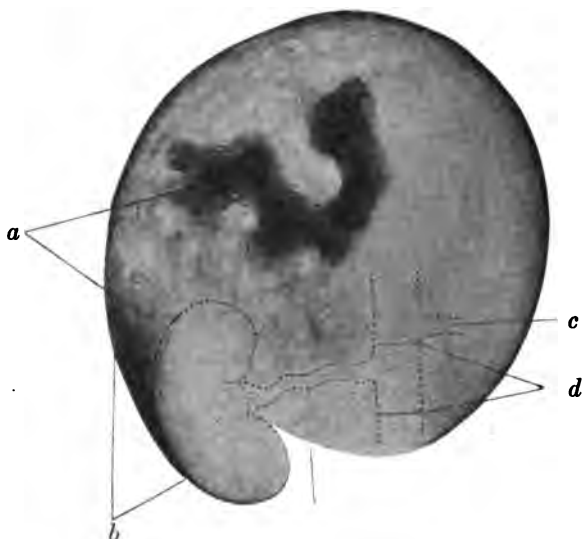
FIG. 51.—Sketch to show relation of a venal tumor to the vena cava, a portion of which was resected by Lexer: *a*, hemorrhages into *b*, the tumor; *c*, left renal vein; *d*, portion of vena cava which was resected.

pushed back out of the way of the suture. A continuous suture is inserted with needles and thread of extreme delicacy.

The question of thrombosis following injury or operation upon a bloodvessel is not sufficiently understood to make intelligible all the results which are seen. A striking absence of thrombosis is seen after the performance of Eck's operation—that is, a lateral anastomosis between the portal vein and the vena cava in order to relieve the portal circulation in cirrhosis of the liver. After one row of sutures is placed the intervening walls of the veins are cut or torn through with small scissor blades.

Lexer[2] in removing from a two-year-old boy a large, soft tumor of the capsule of the right kidney, was obliged to resect about an inch of

[1] Annals of Surgery, 1906, vol. xlvi, p. 350.
[2] Deut. Zeit. f. Chir., 1907, vol. lxxxviii, p. 109.

the vena cava (Fig. 51), and closed both open ends by ligatures. Although the patient lost much blood during the operation, the wound
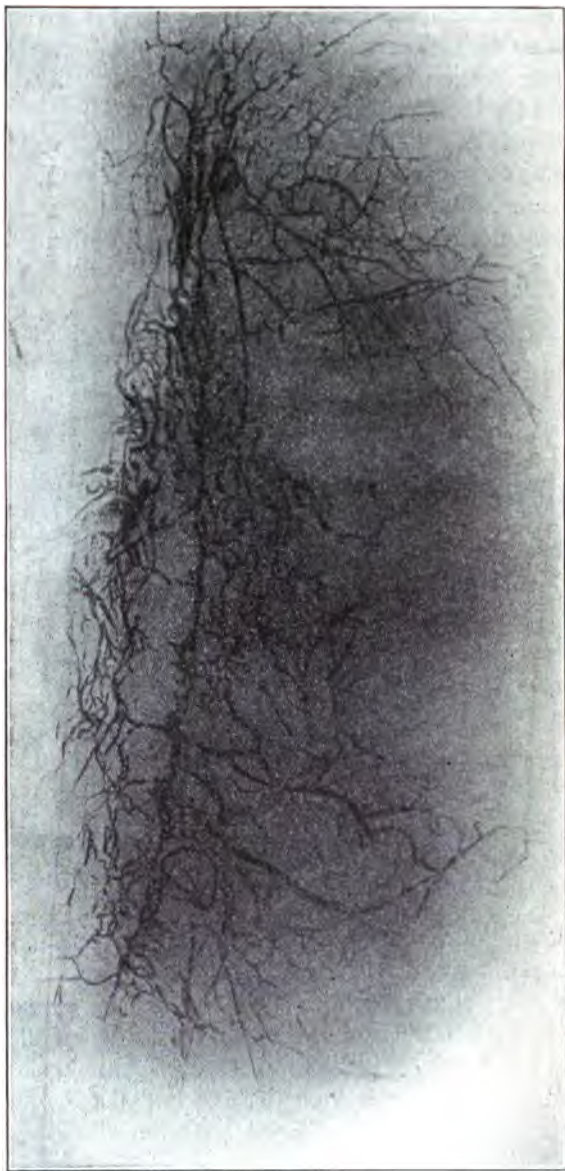
FIG. 52.—Retouched radiograph showing the collateral venous circulation after resection of the vena cava.   (Draudt.)

healed slowly but completely by granulation.   At no time during the convalescence was there any edema of the extremities.   The tumor

recurred and the child died some five months later. In order to show the collateral circulation which had existed in this patient, Draudt washed the blood from the veins, ligated both venal cavæ as they entered the heart, and injected through the femoral vein an emulsion of mercury and turpentine. The result is shown in Fig. 52, made from a rather indistinct radiograph. However, it gives some idea of the great number of small veins which can take up the work of the ligated vena cava. The veins shown are the azygos, vertebral, and others lying close to the spinal column.

Bottine, Houzel, Heresco, and Hartmann have all resected a part of the vena cava, and had their patients recover with no serious results from the ligation. There was a transitory edema in two cases, and none in the other two.

Delaunay[1] recently badly wounded the vena cava inferior in removing a tumor of the kidney. He at once applied a ligature above the opening, and another below it. The patient suffered for some months from distended superficial abdominal veins, from cessation of the menses, and from occasional intestinal hemorrhage. All of these symptoms disappeared and in a year she was in perfect health.

Barnsby[2] sutured a wound in the inferior vena cava about 8 mm. (one-third inch) long, and above the renal veins. Fine linen is better than catgut in such cases, as the latter will not hold a sufficient length of time to insure success. This operator used the perivenous tissues to cover his suture and prevent leakage.

These results become more easily understood when one looks at the subject from an experimental point of view. Thus, Offergeld[3] found that ligature of the inferior vena cava below the renal veins in animals has hardly any effect at all. There is no edema after it, and none but the most transitory effect upon motor and sensory nerves. The work upon the heart is increased, as shown by increased areas of dulness, increased pressure in the carotids, and accentuation of the heart tones; but the original blood pressure is restored in about two days. Ligature of the lesser individual veins, such as a common iliac or internal or external iliac, has no demonstrable effect.

Stich, Makkas, and Dowman[4] for arterial suture use the finest English sewing needles, which they have slightly curved. The silk is sterilized and laid in sterile liquid paraffin oil free from chemical disinfectants. The vessels are clamped lightly, and freed from peri-adventitial tissue, blood clots are expressed, and three tension sutures are inserted exactly and tied. Then continuous over-and-over sutures are inserted from one tension-point to the next. The clamps are lifted and bleeding from certain stitches is stopped by pressure. In this manner they twice sutured

[1] Assoc. Franç. de Chir., 1905, p. 126. [2] Ibid, p. 128.
[3] Deut. Zeit. f. Chir., 1907, vol. lxxxviii, p. 217.
[4] Beit. z. klin. Chir., 1907, vol. liii, p. 113.

the aorta of a dog with temporary good result, one animal dying in three days of peritonitis, the aorta being in good condition; and the other dying in nine days of secondary hemorrhage from the aorta induced apparently by suppuration. Lesser arteries and veins when sutured healed perfectly. An interesting possibility of substituting a section of a vein to make good the loss of a portion of an artery is shown by one of their experiments. They sutured about an inch of the jugular vein of a dog into the gap caused by resection of the same length of carotid artery. This held perfectly, and two months later the vein had grown so thick that it resembled an artery more than a vein. As any one of the large veins of the lower abdomen may be tied with impunity, it may be possible to resect a section, and to implant it in an artery in case of a wound of the latter with loss of substance.

GYNECOLOGY.

By JOHN G. CLARK, M.D.

CANCER OF THE UTERUS.

NOTWITHSTANDING a dearth of brilliant discoveries in the study of the nature and the treatment of cancer, the interest which is attached to it does not seem to lessen. The workers in the field are legion, and carcinoma is more written of at the present time than any other disease. The pessimistic view of it all is that really little has been accomplished. An early diagnosis, as complete a removal as possible—and what more can be said?

What has resulted from the immense amount of experimental research? Many different facts have been observed, but how conflicting they appear and how they fit one theory and not another! Nevertheless, it is likely that some day the riddle will be solved, and it is certain that progress has been made. This is noted by Childe,[1] who says: "Though all attempts to elucidate the origin of cancer have hitherto ended in disappointment, yet it cannot be contended that effort, whether clinical, pathological, experimental, or, lastly, surgical, has during the last quarter of the century been barren of result. It has been devoid, it is true, of any discovery startling enough to arrest the attention of either medical profession or the public."

The progress has been almost unconscious, and it is only by comparing the past with the present that the gap between the old views concerning cancer and the present means of combating this disease is made manifest. He reports that, of the older surgeons, Brodie, Benedikt, and Paget, as the result of their experience with cancer of the breast, considered the disease as surgically hopeless. He says that Sir James Paget, in his lectures on pathology, wrote: "I will not say that such a thing as cure is impossible, but it is so highly improbable that the hope of this occurring in a single instance cannot be reasonably entertained."

"Melancholy enough," says Childe, "as is the picture of our treating cancer at the present time, it must be admitted that it forms a forcible contrast with that just portrayed."

A similar thought is expressed by Loeb,[2] one of the most competent

---

[1] British Medical Journal, July 20, 1907, p. 135.
[2] International Clinics, 1907, vol. iii.

observers in the experimental field. Although he realizes fully that the cause of cancer has not been discovered, he does not agree with those, "who, without hesitation, condense their final conclusion into the short statement that we know nothing, nothing at all about cancer."

Early Diagnosis and Prevention of Cancer. It is an undisputed assertion that the greatest hope for the permanent cure of a cancer lies in its early recognition. Movements have been inaugurated in many sections for the purpose of bringing the cancer patient under surgical advice while the disease is still incipient.

Childe[1] draws attention anew to the fact that in cancer of the cervix most of the patients come too late. He thinks the medical practitioner and the patient are each responsible. He believes the laity should be educated by furnishing clergymen, clergymen's wives, district visitors, and those generally who are in constant touch with the poor and the ignorant, with accurate information on this subject.

The points which should be uppermost in the practitioner's mind when a patient consults him with symptoms referable to a region where cancer occurs primarily are as follows: First the possibility of a cure in an early stage. Second, the age of the patient; in the later half of life cancer is the disease which it is important to exclude or confirm. Third, the dismissal from his mind of all the generally recognized clinical signs of cancer (which are those of the advanced stage of the disease only), and the determination in any questionable case to state to the patient frankly the possibility of the disease and the urgent necessity of clearing up the doubt without delay. From the patient's point of view this is obviously the only safe course, and from that of the medical attendant it is to be commended, for it relieves him at the outset of a great responsibility. Fourth, the method of diagnosis by expert microscopical examination; this deserves to be recognized as the only reliable means, and should supersede every other in the determination of cancer.

Such principles are widely recommended and were emphasized by Spencer, in a discussion of the question published in the British Medical Journal. Spencer[2] draws attention to the fact that more women die from cancer of the uterus than from cancer in any other part of the body. This is shown in the sixty-eighth annual report of the registrar-general of births, deaths, and marriages in England and Wales, where the statistics of deaths in the years 1901 to 1905 are as follows: 19,645 females died from cancer of the uterus; 14,308 died from cancer of the breast; 12,048 from cancer of the stomach; 11,681 from cancer of the liver and gall-bladder; 5870 from cancer of the intestine; 5086 from cancer of the rectum; 1626 from cancer of the ovary; 1523 from cancer of the abdomen; 1401 from cancer of the peritoneum. In no other part of the body did cancer cause 1000 deaths in females.

---

[1] Loc. cit.   [2] British Medical Journal, August 24, 1907, p. 431.

Of the 19,645 deaths from cancer of the uterus, only 30 occurred in females under twenty-five years of age. The highest mortality occurred between the ages of forty-five and fifty-five. There is, then, in cancer of the uterus a disease which carries off annually in England and Wales nearly 4000 adult women, the great majority of them mothers, usually mothers of large families.

The reasons for their not coming under the physician's notice early enough to be cured are found in: (1) The patient's ignorance of the early symptoms of the disease; (2) the practitioner's delay in examining a patient who has symptoms which may be indicative of an early stage of the disease; (3) the patient's disinclination or refusal to submit to examination; (4) the occasional difficulty in distinguishing between benign and malignant tumors, especially of the uterus.

At the time of this discussion Mr. Charles Ryall said that the Cancer Hospital authorities had for a long time been fully alive to the cause of so many cancers being incurable, namely, the ignorance of the public. This fact is seen daily in a great number of hopeless cases that come to the hospital for treatment, cases where a little knowledge beforehand, when the first symptom of the disease manifested itself, might have been of great benefit. The authorities, therefore, issued instructions with the view of educating the patient in the matter relating to cancer, and disseminating the knowledge among the public. These instructions consist of hygienic measures to be adopted by those afflicted with the disease, and also the warning notice that the onset of cancer is very insiduous and early treatment an absolute necessity. He quotes a warning issued to women, and he feels convinced that if some such warning were distributed widely through the country, it would be fraught with much benefit in the important future.

Cancer is a very prevalent disease.

It may occur at any age, but is most frequent between the ages of thirty and sixty.

In spite of its nature, successful results can be obtained if patients will only seek early treatment.

Once the disease appears, it is absolutely necessary that it should be treated without loss of time.

Any delay may be followed by the gravest consequences, as the disease tends to spread and become too far advanced for any hope of cure.

Cancer may appear without any pain or impairment of health, and may even reach the incurable stage without causing much discomfort.

Cancer of the womb is generally associated with some discharge or bleeding.

The discharge varies in character, and may be thick, watery, blood-stained, or offensive.

The bleeding may be small in quantity or excessive, and may occur at or between the monthly periods.

Any bleeding, no matter how small, which occurs at an unusual time requires investigation.

Unfortunately, women afflicted with serious symptoms frequently think that the latter are due to the "change of life," and therefore they consider them of little importance, and delay seeking early treatment.

This delay is one of the causes of so many cases being incurable.

There is a possibility of being misunderstood when information of this character is imparted to the laity, and Bainbridge[1] calls attention to the danger of terrifying patients with ideas concerning the incurability of cancer and the infectiousness of the disease. He reports several examples he has seen of a great fear existing in the lay mind as to the contagiousness and the incurability of cancer. For this reason great care should be taken in imparting information on medical subjects, and an effort should be made to exclude from newspapers any articles which have not been carefully prepared by physicians who are fully alive to the requirements of the situation.

The advantage of microscopical examination in doubtful cases is emphasized by Bashford,[2] who calls attention to the difficulty in the diagnosis of an early cancer by clinical means alone. He mentions 7 cases of cancer of the tongue which were considered by surgeons with much experience to be merely "pre-cancerous." As a further example of the mistakes made when the microscope is not used, Bashford notes an investigation which showed that in a series of cases, 3576 cancers were correctly diagnosticated, 726 cancers were not diagnosticated, and 319 cases were wrongly diagnosticated as cancer.

Montgomery,[3] in speaking of the prevention of cancer, calls attention to the baneful influence on the tissues of gastro-intestinal toxins. The ingestion of inordinate quantities of food, of food ill prepared, unsuitable in character and improperly masticated, necessarily results in decomposition within the intestinal tract and the formation of toxins which produce a deleterious effect on various parts of the body.

He believes that the following measures should be undertaken to lessen the mortality of cancer:

1. The employment of measures at confinement and subsequently to secure a healthy condition of the pelvic organs.

2. The employment of constitutional methods to prevent the formation of gastro-intestinal toxins and to obviate their baneful influence on the tissues of the body.

3. The careful study of pelvic symptoms, in order to insure the early recognition of malignant disease.

4. The resort to early operation for the removal of the organ involved and all the circumjacent tissues that regard for the safety of important

[1] Boston Medical and Surgical Journal, 1907, clvi, No. 26, p. 835.
[2] Clinical Journal, March, 1907.   [3] Jour. Amer. Med. Assoc., 1907, 49, 12, 982.

structures, such as the uterus, bladder, and large pelvic vessels, will permit.

The importance of recognizing local conditions in the genital tract which might predispose to cancer is very great. For this reason bad lacerations of the cervix should be repaired and cases of pruritus vulvæ should be watched with care. Fibroid tumors of the uterus must be regarded as slightly predisposing to a malignant growth. Such measures are analogous to those recommended by Farr[1] in the treatment of pre-cancerous conditions in other parts of the body. He mentions neglected leg ulcers, irritated moles, warts, eczema, scars, sebaceous cysts, gastric ulcer, anal fissure, and ulcer of the rectum.

Porter and White[2] also call attention to the evident connection between *cancer and chronic "x-ray" dermatitis.* They have collected ten cases. They say that all such lesions should be very carefully treated, and excised early if they become ulcerated and persistent.

Cancer in the Lower Animals. The study of cancer in the lower animals has been extensively undertaken in the hope that some light would be shed on the disease as it occurs in the human.

Malignant tumors develop not only in warm-blooded animals, but also in the cold-blooded ones, such as amphibia and fish.

According to Loeb,[3] some species of animals are much more frequently afflicted with cancer than others: cattle more frequently than sheep; dogs more frequently than either of these; mice and rats more frequently than rabbits and guinea-pigs. In certain species certain distinct types of tumor are prevalent. The most frequent variety of malignant tumor among cattle in America is the squamous cell cancer of the inner canthus of the eye. In dogs, lymphosarcoma of the genital organs is prevalent. Sarcoma is relatively common among white rats, while rare among white mice. White mice in turn are frequently affected with carcinoma. The most common tumor in trout is a carcinoma of the thyroid gland.

The earliest experiments with cancer animals were attempts at transplanting the growth from one animal to another. This has been done very extensively, and certain facts have been noted which bear on the possibly infectious nature of the disease, on an immunity, natural or acquired to its growth, and on the regression of the transplanted growth or its change from one form of malignant tumor to another.

Many of these experiments and the deductions made therefrom were reported in PROGRESSIVE MEDICINE for last year. Some of the more recent observations have dealt largely with the ease or the difficulty of transplantation observed in different species and under differing cir-

---

[1] Jour. of the Minn. State Med. Assoc. and Northwest Lancet, December 15, 1906, p 525.

[2] Annals of Surgery, November, 1907, xlvi, p. 5.

[3] Proceedings Path. Soc. of Philadelphia, 1908, xi, No. 1.

cumstances. Loeb found that pieces of tumor behaved very differently when transplanted into the animal affected with a primary tumor, and when transplanted into one not so affected. He used for his experiments an adenoma of the mammary gland. In the primarily affected rat the transplanted piece grew; in other rats it died. He argued from this that the conditions which made the animal a favorable soil for the growth of the primary tumor favored the growth of the implantations.

In this connection the predisposition or the immunity of the animal and the character of the tumor itself has to be considered. Tumors behave very differently in the experiments, even when they have the same structure. Some white mice cancers are practicably untransplantable. On the other hand, carcinoma of a Japanese mouse in Loeb's hands showed 100 per cent. of successful inoculations. The inoculability of the tumor may increase with successive transplantations. Loeb believes that this depends mainly upon a stimulation of the tumor growth by the operative interference. The activity of the cells of the growth may be increased in other ways—for example, by cutting out a piece occasionally or by drawing a silk thread through it. It is also possible to diminish the virulence of the tumor cells by subjecting them to certain unfavorable physical or chemical conditions. Exposure to a temperature of 43° or 44° C. for one-half hour outside the body and certain chemicals decrease the energy with which the transplanted particles grow by a directly depressing effect upon the tumor cells. Loeb's observations are very like those of Flexner and Jobling,[1] who report the successful transplantation of a mixed cell sarcoma which originated in the seminal vesicle of a white rat. It has been transplanted successfully to several hundred rats, both white and mixed gray and white. At first the number of successful transplantations was variable, and sank as low as 20 to 30 per cent., but by selecting the more rapidly growing tumors in a young state the successful results in the last months have averaged 95 per cent.

Rats which have primary tumors may be inoculated a second time successfully. Rats which have successfully withstood one inoculation, however, are less subject to another than control rats in which a tumor is already present. In other words, it appears that rats which have withstood inoculation originally with the less active tumors have been rendered in some degree refractory to inoculation with the more active tumors. A certain but small percentage of spontaneous recovery takes place in rats which have inoculated tumors. By treating the transplantations with salt solution and photodynamic anilines, the living tumor cells can be so modified as to influence the number or percentage of the rats which make spontaneous recoveries. There are indications that the rats which have recovered from the growing tumor are more refractory to subsequent inoculation than normal rats.

[1] Jour. Amer. Med. Assoc., 48, 5, 420.

Beebe,[1] who has made some very interesting observations, says that a certain percentage of animals with transplantation tumors recover spontaneously, and are then immune to further implantations from a tumor of like virulence. The immunity is not absolute, for an immune animal may again become susceptible by any process which would be likely to diminish its general resistance.

He finds that animals, either naturally or spontaneously immune, may be successfully planted after suffering one or two very severe hemorrhages. Again, an animal may be immune to implantation when first received at the laboratory, and yet, after living in the cages for a few months, may be successfully planted.

Beebe's results with the transplantation of tumor cells into primary tumor animals are quite in accordance with those of Loeb and Flexner and Jobling. In his work he has found no more evidence of immunity to secondary plants than to primary plants. If an animal is growing a tumor, it can nearly always be successfully planted again from its own tumor. He has noted one instance in which the primary plants were all regressing, while secondary plants were growing steadily.

"The question of immunity to an experimentally cultivated tumor," says Beebe, "is of great complexity, due to variation in the tumor graft and the method of transplantation; so that at present it can only be said that immunity is relative, that it may be either natural or acquired, and that it has thus far been developed experimentally only by the actual growth and the regression of a tumor in a selected animal."

From some of his experiments the author is inclined to believe that the blood may contain some expression of the immune condition of an animal, and if so, the possibility of transferring this immunity to a second individual is open. This is indicated by the exposure of thin slices of freshly removed tumors to the defibrinated blood of both susceptible and immune animals. The serum from the recovered animal has a deleterious effect on the tumor cells in the transplantation experiments. Animals with actively growing tumors, which are bled and transfused with the whole blood from immune animals, show sometimes a regression of the tumor.

Such a result has not invariably followed, but if Beebe's observations of these experiments, in which he was assisted by Crile, were summarized, he would say that the beneficial results have varied with the condition of the donor and the amount of blood transfused.

An apparent connection between the production of immunity and changes in the structure of a transplanted and growing tumor has recently been noted by Apolant.[2]

As a rule, a transplanted tumor preserves its original histological structure through many successive generations of mice. Both cancer

---

[1] Jour. Amer. Med. Assoc., 49, 18, 1492.

[2] Münch. med. Woch., 1907, liv, 1720; Jour. Amer. Med. Assoc. 49, 25, 2087.

and sarcoma, however, may rarely exhibit some variation, the sarcoma assuming a more or less endotheliomatous structure, and a cancer taking the form of a sarcoma. It is unlikely that there is ever a transformation of cancer into sarcoma; the sarcomatous tissue which appears is probably due to a stimulation of the growth of the connective tissue of either the original tumor or of the host.

Although instances of the conversion of a benign into a malignant growth are frequent enough, the reverse of such a process, viz., a change in the structure of a malignant tumor to that of a benign one, is unknown. It is true that cancers undergo regression, but histologically this has appeared more as an atrophy of the tumor cells with a contraction of the surrounding connective tissue.

Apolant, however, experimenting with an implantation cancer which had remained unaltered through several generations of mice, found that it assumed the histological appearance of a benign growth (adenoma) in certain mice which had been partially immunized. Should these observations of Apolant be confirmed, they would appear to indicate that the natural or artificial resistance of an animal to a new growth is a factor in determining whether the tumor assumes a benign or a malignant form. Until the interpretation given by Apolant to the changes in the tumors which he found is determined to be unquestionably true, it is useless to speculate on the significance which may be attached to such a fact.

CANCER CACHEXIA. In regard to cancer cachexia, Beebe observed that it appeared late in the growth of the tumor, after general metastases had appeared and the growth became necrotic. There is then a comparatively large amount of autolyzed tumor products capable of absorption. Weil found that extracts from the tumor, particularly the animal saline extracts from necrotic tumors, contain a very active hemolysin. Beebe believes, therefore, that necrotic tumors contain substances which are toxic for normal body cells; this toxin toward red blood cells being expressed as a hemolytic effect. Hansemann,[1] calls attention also to some deleterious influence on the digestive organs as a cause of cancer cachexia.

OTHER OBSERVATIONS ON THE PATHOLOGY OF CANCER. Engelhorn[2] reports thirteen cases of cancer occurring in the stomach and the ovary at the same time. Ovarian cancer may be secondary to gastric cancer or it may arise independently.

Clairmont[3] following Krompecher distinguishes between cancers which arise from the superficial layers of squamous epithelium and those which develop from the deepest layers of cells.

---

[1] Zeitschr. f. Krebsforsch., 1906, iv, 565.
[2] Beit. z. Geburtsh. u. Gynäk, Bd. xi, Nr. 2.
[3] Archiv. f. klin. Chirurg., Bd. lxxxiv, Nr. 1, p. 98.

Boinet[1] is inclined to believe that cancer in one generation predisposes to tuberculosis in the next. His conclusions are drawn from 800 autopsies, including 272 cases of tuberculosis.

McConnell[2] made an investigation to see if there was any relationship between the development of a cancer, especially one of the skin, and the changes which take place in the elastic tissue in advanced life.

The thought arose as to whether on account of degeneration of elastic tissue there was a loss of the restraining power which normally determined the point at which proliferation of cells should cease. Sixty-five specimens were examined. As a result the author says that, although degeneration of the elastic tissue may have a bearing on the development of new growths, nothing has been found in his cases that allows any definite conclusions. The impression gained is that in the region of the growth itself most of the changes are mechanical, but fragmentation of the elastic fibers was found in what was otherwise apparently normal tissue.

Etiology of Cancer. The Parasitic Theory. It has been noted by a number of authors that tumors in animals occur endemically. In Wyoming, Loeb[3] found a ranch on which for ten years cancer of the eye had been endemic among the cattle, although the neighboring ranches were practically free from the disease. An endemic occurrence in trout has been noted by Pick. Loeb notes the fact that an endemic occurrence of cancer has also been found in man, but the difference between the human condition and the animal is that while in the former different varieties of tumor were observed, in the latter it was always precisely the same kind of tumor.

Does such an endemic occurrence indicate a parasitic origin of the growths? In an able review of the subject, Loeb[4] concluded in part as follows:

The hereditary transmission of certain predisposing conditions from parents to offspring is one of the factors causing the so-called endemic occurrence of cancer among animals. The predisposing condition may take the form of certain bodily defects which later develop into tumors. Thus, an unusual anomaly is described in a female mouse affected with a tumor; a structure closely resembling the epididymis was found in the axilla. Other mice sent by a breeder, among whose stock tumors had been found, showed in each case the development of a large cyst in the neck. There is a possibility of a relationship between these anomalies and the formation of certain tumors in the mouse.

No value is placed by this author on the parasitic theory of the disease as ordinarily implied by the term. Much the same is the view of Bash-

---

[1] Bulletin de l'Académie de Médecine, 71, 34, p. 228.
[2] Jour. Med. Research, March, 1907, new series, xi, p. 7.   [3] Loc. cit.
[4] University of Pennsylvania Medical Bulletin, March–April, 1907.

ford and Murry,[1] who say that the artificial transference of cancer is absolutely distinct from all known processes of infection. The housing of mice suffering naturally from cancer with normal animals, has yielded no evidence of sporadic infection or epidemics. Their observations have now been extended over a longer period than previous investigations, and much longer than a mouse lives (three years).

The positive statements made in regard to infection, when small animals suffering from cancer are housed with normal animals, can be referred to fallacious observation, erroneous deduction, and unwarranted assertion by those without personal experience. The very positive statements about infection in the case of mice are at present devoid of any scientific value.

Beebe[2] also thinks there is no reason to ascribe the transplantability of tumors to the action of a microörganism. One might just as well consider as infectious, transplanted and growing normal epithelium.

There are those, however, who take an opposite view. Gaylord and Clowes[3] have written a most interesting paper describing what they consider an undoubted example of cancer infection.

They report that in 1902 Loeb carried out a series of inoculations at the State Cancer Laboratory in Buffalo. For this purpose two large cages and a number of smaller ones were made. During the course of his stay in Buffalo, these cages all contained, at one time or another, numbers of successfully inoculated rats. In 1902 the experiments were concluded and the rats were removed. From December, 1902, until the summer of 1903 there were no rats in the laboratory. The smaller cages which had been used by Loeb were sterilized by dry heat.

The two larger ones, being rather bulky for this procedure, were brushed out and stored in the back part of the animal room, where they remained unused until the summer of 1903, when they were taken to house a number of rats brought into the laboratory for purposes of study other than tumor implantation. These rats had been obtained from a totally distinct source from those which Loeb had used. They were killed at various periods, and on the conclusion of the work perhaps a dozen animals were left in the two large cages—in one cage four; in the other, six or eight.

In July, 1904, in one of the two large cages, containing four rats, an animal was discovered with a large tumor on the right abdominal aspect, and a smaller tumor adjacent to it in the axillary region, about the size of a hazel nut. The large tumor was removed on July 12, and proved to be a slow-growing fibrosarcoma. Portions of the tumor were inoculated into a number of rats, but none of these subsequently developed tumors. There was no local recurrence of the tumor, and when the

---

[1] Lancet, March 23, 1907, p. 798.   [2] Loc. cit.
[3] Journal of the American Medical Association, 48, 1.

animal died, some months later, the smaller nodule in the axilla was found not to have changed in size. The remaining rats were removed from both cages.

Eight rats were now placed in the cage in which the tumor had appeared, from an entirely new supply, and in the other cage six or eight of the same supply of rats. The rats remained undisturbed in these cages, in the basement of the laboratory, from August, 1904, until October, 1905. At this time three adult rats remained in the cage in which the first tumor had been found, the others having died of intercurrent disease (tuberculosis). There were also eleven offspring.

Of the three adult rats, one had a tumor located on the right side of the abdomen directly behind the right fore-leg. Another animal had a tumor in the thyroid region, the size of a walnut. Both of these animals were males. The rat with the thyroid tumor died, and an examination of the tumor showed it to be a spindle-celled sarcoma, and closely resembling the thyroid tumor used in Loeb's experiments on the rats which had originally occupied the cage.

The second rat with an abdominal tumor was subjected to an operation in October, 1905. The tumor was mostly removed, but a small piece was left. The animal died in January, 1906, and an autopsy showed that the nodule which had been left had greatly increased in size and had infiltrated the surrounding tissues. There were metastases to the liver, to the mesentery, and to the peritoneal surfaces of the intestines and the spleen.

Sarcoma of the thyroid in the rat is a rare affection. So much so that the authors were unable to find reports of this disease except in the case of the three primary tumors observed by Loeb, and upon inquiring of 325 breeders of small animals, and offering twenty-five dollars reward for each animal so affected, no indisputable case could be found. Answers were received from 57 dealers, who reported having had about 20,000 white rats in their establishments.

The first and the last of the tumors occurring in animals kept in the infected cage were fibrosarcomas. Neither could be transplanted. The first one was totally removed and did not recur. The second one was left partly in situ, and the animal died of abundant metastases of rapidly growing spindle-cell sarcoma. These tumors must then be looked on as malignant, although they were not transplantable and the first one did not recur.

In the light of the observations of Ehrlich and Apolant, who have demonstrated beyond doubt that even a cancer under given conditions can lead to the development of a sarcoma in the connective tissue immediately adjacent to it, the authors consider it an unnecessary refinement to attribute the three cases of sarcoma to any other than a common source, even though the tumors occurred in different regions and were somewhat different in structure and experimental characteristics.

Heredity may be positively excluded in these cases, from the fact that the animals occupying the cage from 1903 to 1904 were derived from a distinct source, in a widely distant city, from rats which occupied the cage from 1904 to 1905. The most logical explanation of the manner in which the cage became infected is found in the fact that it was used in 1902 by Loeb, who kept in it at that time rats which had been inoculated with cystic sarcoma of the thyroid.

The authors also narrate the story of a cage belonging to a certain dealer, in which during the winter of 1903 to 1904 several mice developed tumors. From April to November, 1904, 25 to 30 mice were so affected. After that, in order to get rid of this unfortunate disease, the dealer removed the old stock entirely from the cage, and brought 12 adult healthy mice from another source, and changed the location of the cage. During the course of this winter three or four more tumors developed.

Since the spring of 1905 the cage has been on a table, in a large room where the conditions of light and ventilation are excellent. During the last year he has removed from the cage between 25 and 30 mice having tumors. In this cage, therefore, during the last three years, about 60 spontaneous tumors have occurred.

In the other cages of the establishment the dealer has only infrequently observed the development of cancer, and these had been stocked from the old cage. The dealer himself regarded the old cage as the source of the infection. The fact that the location of the cage was frequently changed, and the stock entirely renewed on at least one occasion without any definite interference with the production of tumors, makes this conclusion obvious. The cage is made of wood, and is screened off with netting at one end. The interior is dark and damp, and presents a general unhygienic appearance; the walls are encrusted with excreta.

Gaylord believes that in certain breeding establishments cancer in mice is endemic. In others, however, it does not occur. Although they have communicated with 325 dealers in pet animals, and offered twenty-five dollars for any small animal affected with cancer, mice with tumors have been received from but four; three other dealers, from whom there were repeated shipments of normal mice, found no cancers whatever in their stock. From one dealer, who shipped them not less than 1200 normal mice in the last two years, it is learned that he has never seen an example of cancer in his own stock of mice. That he is able to recognize the disease is shown by his having secured a mouse so affected from another dealer.

Apropos of his belief that mouse tumors are infections, Gaylord[1] reports the discovery of a spirocheta. He says that it is an organism 2.5 to 7.8 μ in length, and $\frac{6}{10}$ μ in width, having four to thirteen

[1] Journal of Infectious Diseases, 1907, vol. iv, p. 155.

turns. The spirocheta was demonstrated in ten consecutive spontaneous cancers of the breast in mice obtained in Massachusetts, Ohio, and New York. Sixteen transplanted tumors from three different sources showed the organism. The examination of fresh material from all of the transplanted uncontaminated tumors of these strains demonstrates the organism in the living state. It is frequently motile, and is found with difficulty.

Measurements of the fresh organism correspond closely with those of the stained preparations. The organism is most prevalent in the actively growing parts of a primary tumor. In early transplanted tumors they are found at the growing edge in the connective tissue or between the cells. The more virulent tumors contain the greatest number of organisms. Evidences of phagocytosis are found on the part of the epithelial cells.

In two growths badly contaminated by bacteria no spirochetas could be found. An examination of the organs and the subcutaneous tissues of five normal mice, stained by Levaditi's method, has been negative. Attempts to stain the organism with the aniline dyes have been unsuccessful.

"My observations," Gaylord says, "do not as yet establish an etiological relation between this organism and cancer of the breast in mice; but the presence of the organism in primary mouse cancers, with which it is regularly transplanted through many generations, greatly increasing in number as the tumors increase in virulence, instead of interfering with and finally preventing transplantation, as do bacteria, is suggestive."

Behla[1] is another observer who persistently adheres to the idea that cancer is infectious. He is particularly impressed with the relation between the prevalence of *cancer and the water supply*. The idea that such a relation exists between cancer and water dates far back. It was spoken of in England in 1880. Haviland, on the grounds of geographical studies, came to the conclusion that cancer was frequent along rivers which periodically overflow and where the soil is clayey. The population on the banks of the Avon at Stratford, on the Thames at Oxford, and the inhabitants of Richmond and London are strongly predisposed to cancer. Behla quotes observations of Jackson, Nason, D'Arcy Power, Arnaudet, Mathieu, and many others, to show that cancer is more prevalent in damp and marshy regions. The same facts are noted in observations which are quoted from Spain, Norway, Holland, France, Italy, Switzerland, Hungary, and Germany.

As corroborative of his theory, Behla quotes Nagele, chief physician of the "Würtemberg Landesvereins." The latter concluded, from his study of the district of Böbligen, that cancer was more frequently found

---

[1] Zeitschr. f. Krebsforsch., 1907, p. 137.

in localities adjacent to streams where the water was contaminated by the sewage of several towns or of large municipalities. Places which lay entirely removed from a water course were partly or almost entirely free of cancer. In places where the pollution of the stream by waste water was most pronounced, cancer of the digestive organs was frequently met.

The frequent occurrence of *cancer in fish* is a further indication of the possible participation of water in the causation of cancer. As noted by Pick, Hofer, and Plehn, cancer in trout occurs endemically in certain tanks of certain fish hatcheries. The fish are usually two, three, to five years old. All forms of brook trout are susceptible. The endemic occurrence of cancer in fish, Behla believes, tends to indicate a parasitic origin of cancer. Pick does not attribute tumors in fish to a parasite, but thinks that certain conditions may change a benign goitre to a malignant one, just as is observed in man. Plehn disagrees with Pick, however, and says that a benign endemic goitre in brook trout is unknown. The tumors may appear in fish of one tank and not be present in those of a neighboring tank, even though it is supplied by the same water. The disease may be prevalent in one tank for a while, and then disappear without any alteration of the water supply.

It has also been observed that cancer may occur one year, and not the next, even in the same tank with the same water supply. Heritage does not seem to play any part when it is considered that the inhabitants are usually two or three years old and come from different parents. A number of factors make it rather apparent that there is a parasite which has either gained entrance to the tank, or has developed there.

It is known, also, that other affections in fish, for instance, barbel disease and carp pox, are caused by a parasite.

If, therefore, the exciting cause of cancer in fish is found in water, why may not the cause of cancer in man be found there also? The presence of the cancer parasite in water would afford an explanation for the observation that cancer is rare in localities where the earth is dry and porous, while in places where the soil is damp and saturated with organic material the disease is frequent. Behla thinks it unquestionable that the cancer exciter (parasite), whatever its nature, finds a favorable condition for growth in damp soil.

He calls attention to the fact that the earth frequently contains the bacillus of tetanus. He also affirms that cabbage cancer is endemic, and that the *plasmodiophora brassica* vegetates in the earth. Although no one is able at the present time to recover this organism by culture from the earth, nevertheless, the author has repeatedly sewn cabbage seed where he suspected the presence of the germ, and within a few months found the tumor on the roots of the plant.

What form the supposed exciter of cancer takes is a puzzle which at present is unanswerable. Behla does not believe that it is a bacillus.

The exciter of cancer must have the power of forming an epithelial tumor, not simply a granuloma. Exact knowledge concerning the parasite, will come gradually, just as alchemy preceded chemistry and astrology preceded astronomy.

All that can be said at present is that the cancer cell is the parasite of cancer. The cancer cell is an epithelial cell, plus something more, which produces unlimited and destructive growth. Perhaps this malignancy depends upon the presence of a ferment, as Blumenthal has recently suggested. The fact that epithelium may proliferate in an entirely benign fashion, indicates that there must be something in addition to the cell in a malignant proliferation. If the irritation which produced a malignant change was associated with old age, certainly many more people would have cancer. And if old age had any influence, why is there so much difference in the frequency of cancer in different localities? Why is cancer of the breast or of the uterus so seldom seen in the African negro? C. Dalgethy, during five years in Adampore, among 27,000 laboring people, did not find one case of breast cancer, although the women suffered from mastitis, eczema, and other diseases of the breast.

The importance given to irritation, traumatic and chemical, in the production of cancer has not been justified, else it were possible to produce cancer in animals which are susceptible.

Behla does not believe in the theory of Cohnheim. If this were correct, there would be many more cases of cancer in man, because there are so many displaced epithelial cells. He does not deny that there are congenital tumors which are unlimited in growth and have a lethal termination, but these he would separate from malignant tumors in general. The varying geographical distribution of cancer speaks against the theory of Cohnheim. It has certainly been shown in the *Zeitschrift für Ethnologie* that malformations occur in wild peoples just the same as in our own race, and yet the African negro does not show the same frequency of cancer in Africa as he does in America.

The variation in the distribution of cancer is best explained by the parasitic theory. The organism does not occur in some parts of the earth; in others it occurs with increased frequency. There are villages free from cancer and villages filled with it almost next door, while the inhabitants of both pursue the same manner of living; only the location is different.

The author also draws attention to the difference in the frequency of cancer in the same place at different times. Do we not have this same phenomena in acute infectious disease, as, for instance, in typhoid?

Cancer *a deux* is more or less frequent, but no instances of double benign tumors are found, as, for example, fibroma *a deux* or lipoma *a deux*.

The treatment of cancer is just about as unsatisfactory as the treatment of infectious diseases. Once existing, it cannot be aborted.

The chief question concerning the prophylaxis of cancer, the question of all questions is, How can one avoid cancer?

Behla believes that one of the most important prophylactic measures is a good water supply and the observation of great personal cleanliness. He gives several examples of where a lack of cleanliness seems to predispose to cancer, and where a rigid observation of cleanliness seems to guard against it. •

He believes that the cause of cancer once known, there will result as great a diminution in the number of cases as occurred•in puerperal fever after its true nature was discovered.

In regard to the experiments with mice, it is very doubtful whether they will bring much light concerning the etiology of cancer.

Behla has tried to produce cancer in gold-fish with human cancer juice. He was not successful, although cancer does occur primarily in gold-fish. He speaks of the possibility of experimentation with water in which trout cancer is epidemic; making an effort to infect animals susceptible to cancer, as mice, rats, and dogs.

An editorial[1] commenting on a study, by Dietrich,[2] mentions Gaylord's spirocheta. Dietrich found no good evidence for the view that cancers, even the ones most easily transmitted from animal to animal, are due to parasitic invasion, a conclusion with which the majority of workers in this field seem to be in accord. The recent observation of spirocheta in transplanted mice tumors by Gaylord does not seem to weigh against this conclusion, for Tyzzer has found similar structures in mice without cancers.

Another editorial[3] remarks: If mouse cancer, so-called, is shown to be of spirochetal origin, that would not necessarily mean that human malignant tumors are also spirochetal growths. The demonstration that growths in animals which correspond in certain essential points to human cancer are of infectious origin naturally would give strong support to the so-called parasite theory of cancer. Nevertheless, the one fact, to mention only one, that the cancerous growths have been found without exception to be transplantable only within the species in which they arise spontaneously, indicates that the causative agent, whatever its nature, in each case is peculiar to the species in question.

Councilman[4] says that the parasitic theory has not been proved, because no agent has been discovered which is able to excite a cancerous proliferation. The part which the tissue plays is to act as a host, in greater or less degree hostile to the invader. The only parasite it would

[1] Journal of American Medical Association, vol. xlviii, No. 24, p. 2030.
[2] Deutsch. med. Woch., March 28, 1907, 495.
[3] Journal of the American Medical Association, vol. xlviii, No. 16, p. 1352.
[4] Boston Medical and Surgical Journal, September 5, 1907, vol. clvii, No. 10, p. 313.

be possible to conceive of would be one living within the cell and transferred with the cell.

OTHER THEORIES AS TO THE ORIGIN OF CANCER. *Traumatic.* In speaking of the traumatic theory of tumor formation, Councilman[1] says that there is a tendency always to connect a present with an antecedent event. A careful inquiry can usually elicit the history of an injury which would otherwise be forgotten. The tendency to refer a tumor to an injury seems to him very much like the widespread belief of the laity that a malformation may be due to some event which has produced a mental impression on the mother.

Trauma is said to act in two ways in causing a tumor. First, it excites cells to proliferation. Second, it separates cells from their connection with the tissues to which they belong, and such separated cells may assume independent characters and become the nucleus of tumors.

Councilman calls attention to the tenacity with which surgeons hold to the traumatic theory of tumor formation, and yet the possibility of a tumor following the traumatisms which they are constantly producing does not enter into their calculation. If the traumatic theory was very pertinent, there would be very frequent combinations of trauma and tumors, for both are very common.

The theory lacks all experimental confirmation, and, as it stands at present, it has much the same footing as does the theory of maternal impression as the cause of malformation; in both there are many striking coincidences.

The view of Councilman[2] just given is contrasted with the view of Herzfeld[3] who says that there is no tumor without trauma, and notes 130 cases collected by Brun, Röpke, Geinatz, and Löwenstein, in which there seemed to be a direct relation between traumatism and the development of a malignant growth. The view of Councilman is as extreme as that of Herzfeld. Meller[4] alleges a difference in the location of surface cancer in males and females, and regards it as significant of a traumatic origin for these growths. Thus, cancer of the ear is more frequent in men and cancer of the forehead more common in women, because these parts are less protected in the respective sex.

Quigley[5] calls attention to self-induced abortion and office treatments, which he thinks play an important part in the cause of cancer. He cites the fact that the cervix is the most common place for uterine cancer, and also the place most subject to the irritation of office treatment, or the use of some device for inducing abortion.

[1] Loc. cit.

[2] Journal of the American Medical Association, vol. xlix, No. 16, Ed.

[3] Zeitschr. f. Krebsforsch., 1905, iii, p. 72.

[4] Ibid., 1907, Band vi, p. 64.

[5] Journal of the American Medical Association, 48, 7, 625.

Hallion[1] argues against the traumatic theory of cancer, noting great difference between the proliferation induced by continued irritation and malignant proliferation.

In connection with the traumatic theory, it is interesting to note the work of Leaf,[2] who presents an analysis of the histories of a hundred cases of cancer of the breast. The cases were under his care and that of a colleague in London. He investigated the age, social condition, family history, and errors of lactation. Under the latter were included unduly prolonged, absence of, or insufficient lactation.

Previous disease of the breasts, injury, corsets, worry, anxiety, residence with damp and defective drainage, general health, occupation, cancer infection, tubercle infection, cancer houses, applications to the breast, all were considered. The five factors most commonly present were as follows:

	Per cent.
Errors of lactation	71
Family history of consumption	39
Damp and defective drainage	37
Injury	35
Worry and anxiety	35

Clinical facts seem to show that cancer of the breast is very rarely due to one cause only. In by far the majority it is due to a combination of causes, and of these he considers those just mentioned of paramount importance.

But it would appear that the causes in one case may not be identical with those in another, or the combination of causes may be different, and in cancer of the breast, at any rate, and probably in cancer of other regions, he cannot help feeling strongly that under the term "Cancer" are frequently included conditions which, though the microscopic appearances are identical, at least owe their origin to different causes.

In the experiments which he has been conducting for the last four years on rabbits, monkeys, and dogs, he has endeavored to reproduce in animals some of the influences which he thought were pertinent in the production of cancer in the human subject.

The following experiments were made.

1. Irritation of the mammæ for long periods by contusion, compression, and scraping.

2. Irritation of the mammæ, the resistance capacity having been previously lowered by repeated venesection.

3. Injection of fresh cancer juice into a previously irritated surface.

4. Burying portions of skin, subcutaneously and in the lymphatic glands.

5. Irritation combined with diminution of the blood supply of a part.

6. Rendering the irritated part acid. (Poehl maintains that healthy

[1] Presse Médicale, li, p. 402.   [2] Zeitschr. f. Krebsforsch., 1907, p. 129.

internal respiration or metabolism can only take place in an alkaline medium.)

7. Scraping and injecting epithelial cells into a previously irritated surface.

8. Subcutaneous insertion of portions of periosteum and of nail matrix.

9. Rubbing of mice excreta into raw surfaces; as mice are subject to cancer, it was thought possible that this might produce one.

10. Subcutaneous burial of portions of damp mould, to observe whether any microörganism contained therein was capable of causing a cancer.

He says that time does not permit the detail of each experiment. He need only remark that after four years of strenuous endeavor to originate a cancer *de novo, délête*, he has failed to do so.

In his experiments he has found, as others have, that human cancer inserted beneath the skin into the peritoneum is soon absorbed, and the same thing happens with a piece of skin or a portion of periosteum or nail bed.

What struck him as most remarkable in these experiments was the fact that, in animals, the longer the irritation was kept up the less local effect in the way of inflammation seemed to be produced, and the wounds showed a remarkable tendency to heal, and this, too, without suppuration. Taking these facts into consideration, and knowing that the transplantation of human cancer and of mouse cancer, into animals other than mice, is almost invariably attended with failure, he cannot help feeling that there must be some substance in the serum of animals which either preëxists or is capable of being produced in great quantities, and to this substance animals must owe their remarkable resistance and their power to withstand the development of cancer and the effects of prolonged irritation.

If the difficulty which attends the origination of a malignant growth *de novo* in an aminal is compared with the apparent ease with which it originates in the human breast after various kinds of irritation, one is almost forced to the conclusion that the resisting power must be considerably less in the human subject than it is in most animals.

As far as cancer of the breast is concerned, he believes this diminished resisting power is caused in a fair proportion of cases by (a) a family predisposition to tubercle, and (b) a residence amid damp surroundings. Owing to the difficulty of reproducing these factors in animals, and of thus lowering what we may call their resistance capacity to the requisite amount, the artificial production of cancer is a difficult matter.

Senility. Bovee[1] calls attention to the fact that cancer occurs late in life, and reports that Edmund Owen noted the same incidence in the lower vertebrates; among 63,000 head of cattle slaughtered in Glasgow

[1] Journal of the American Medical Association, 49, 12, 979.

in 1902, cancer was found in 27. The diseased were all old cows sent from Ireland.

Copeman[1] believes that any actual increase in cancer may in all probability be set down to the greater duration of life in both sexes which has been gradually brought about during the last half century.

Bashford[2] also calls attention to the factor of age in cancer. He says that while new growths are less frequent in animals than in man, a consideration of the causes of this infrequency serves only to emphasize the importance of old age in determining their occurrence.. The relative infrequency in animals other than man is probably due to various causes. When the tenure of life is short, the period of comparative immunity to cancer is correspondingly shortened, but the period of a maximum of liability is still more greatly abbreviated. For example, in the case of a mouse, these periods are, respectively, two years and one year.

Where life is much longer than in man, for example, in the reptiles, whose duration of life is reckoned sometimes by hundreds of years, the total number of animals coming under observation at the time when they are most liable to cancer is extremely small. In the case of wild animals, those approaching decrepitude are either killed or die of starvation. Under natural conditions of life, animals rarely survive the period of functional activity of the reproductive organs.

The cogency of these observations is reinforced by the relatively greater frequency of cancer in the domesticated mammals, and more particularly in those which for sentimental or commercial reasons are allowed to attain old age.

On the contrary, among the domesticated animals which are killed when still young, for example, pigs, cancer is extremely rare. The frequency of cancer among the negroes of America contrasts with the rarity of the disease among the natives in Central Africa; but it also adds force to the same line of argument. All the preceding considerations lead one to suspect that civilized man's responsibility for the occurrence of cancer among native races brought into contact with civilization, and in domestic mammals, may merely be limited to providing them with opportunities for reaching their respective cancer ages.

The "Attraxin" Theory. McConnell,[3] following the work of Fischer, was able by the injection of olive oil, to which was added Scharlach R., to produce an epithelial proliferation which histologically closely resembled a squamous epithelioma.

Fischer elaborated a theory in explanation of his results. He believes that the injected material contains a substance which has the power

---

[1] The Practitioner, August, 1907, vol. lxxix, p. 185.

[2] Clinical Journal, London, March 13 and 20, 1907, pp. 346 and 365.

[3] Journal of the American Medical Association, 49, 18, 1498

of attracting epithelial cells. To this substance he gave the name, "attraxin."

As shown by Loeb, it would appear that an alteration in the physico-chemical relations of the tissues could give rise to a proliferation of certain cells. That Scharlach oil did not act directly as an irritant, Fischer believed he proved by using the solution externally on the ear of the rabbit without any results. That there may be specific attractions, would seem to be indicated by the fact that the injection of the Scharlach oil was unable to produce the epithelial changes anywhere else than in the skin.

McConnell's results were positive, the conditions he produced being like those reported by Fischer in essential particulars.

It might be said that "attraxins," by their physico-chemical action, cause cells separated from parent epithelium, or embryonal rests, to take on active proliferation.

As mentioned by Fischer, the reaction observed in his and McConnell's experiments should be used to support the contention that neoplasms are brought about by parasites. The microörganisms in their growth elaborate certain substances, "attraxins," which exert a chemotactic influence on the surrounding cells. It would, however, be necessary to imagine different forms of living matter as the exciting causes of the many varieties of tumors.

Stahr,[1] also confirms the experimental results obtained by Fischer.

Nerve Lesions. Cheatle[2] reports several cases of skin cancer associated with changes in the posterior spinal root ganglia. He draws attention to several questions which arise in his mind as a result of the observation:

1. Is the inflammatory change within the posterior spinal root ganglia in any way connected with the origin or the spread of cancer?

2. If it is, did it exist before the cancer began, and hence had it anything to do with the genesis or the point of incidence?

3. Or, if it occurred secondary to the cancer, had its presence anything to do with the spread of that disease?

Germinal Theory. Councilman[3] thinks that the germinal theory accords best with what is known of tumors, and so far as he knows, there is nothing incompatible with it. He assumes that at a certain period germinal rests gain a power which enables unrestricted growth to take place, or what amounts to the same thing, the other tissues lose their power of restraining and regulating growth.

Other Theories. Anderson[4] believes that the occurrence of cancer is related to the function of the thymus gland; Hallion[5] believes that

[1] Münch. med. Woch., 54, 24, 1178.   [2] Brit. Med. Jour., July 20, 1907, p. 140.
[3] Loc. cit.   [4] Norsk. Magaz. f. Laegevid, August, 1907, vol. lxviii.
[5] Journal of the American Medical Association, 49, 883.

carcinoma is originated by a sort of fecundation of one cell by another, Von Bruns[1] thinks that epithelial cells which are being shut off from their supply of blood may be obliged to obtain their sustenance on the surrounding tissues and thus take on a parasitic nature. He believes this occurs in the formation of the x-ray cancer.

Beard's Theory. Last year I extensively reviewed the theory elaborated by Beard.[2] He has recently given a classification of tumors indicating the types of new growth which are amenable to treatment by means of *trypsin* and *amylopsin.* He says that owing to the circumstance that the cycle of life is really a continuous procession and succession of unicellular organisms—germ-cells, from which there arise an asexual generation or trophoblast, and an embryonic or sexual generation—the tumors can be classified into three groups, as follows:

1. *Embryomata. Benign Neoplasms.* Pathological manifestations of some greater or lesser portion of the sexual generation, "the embryo." They are composed of real tissues, that is, normal or somatic ("embryonic") cells or tissues. At its basis each is a larger or a smaller portion of a twin, triplet, etc., identical with the individual containing it. They are endowed with indefinite powers of growth, and they nourish themselves like other normal tissues.

2. *Amphimyxomata. Malignant Neoplasms.* Combinations of embryomata and trophoblastomata. Pathological manifestations or attempts to reproduce the whole life cycle, including trophoblast and embryo. They are transitional forms. (The mixed tumors of Wilms are not all malignant, some being merely embryomata.)

3. *Trophoblastomata* (cancer and sarcoma). *Malignant neoplasms.* Pathological manifestations of the asexual portion (trophoblast) of the life cycle. They never include or repeat any part of an embryo. They are never composed of somatic ("embryonic") cells, though they may mimic such or even resemble no other cells in the body. As Fleischmann, Paget, and Bland-Sutton pointed out, they are "imitation tissues." They exhibit powers of unlimited growth and increase, and they nourish themselves by eroding and destroying normal cells and tissues in a manner exactly like that of the trophoblast of normal gestation, and by means of a ferment acting intracellularly, viz., malignin.

As the two latter divisions are made up of malignant tumors, it is for them, and not for the members of the first group, that the enzyme treatment is intended.

Spontaneous Disappearance of Cancer. In PROGRESSIVE MEDICINE of last year I reported the spontaneous regression of cancer in mice and noted the result of an investigation by Gaylord, which showed that there were 14 authentic cases of spontaneous regression in man; 7 of

---

[1] Beiträge z. klinische Chirurgie, vol. xliv.

[2] Medical Record, New York, February 28, 1907, vol. lxxi, No. 5.

the cases, however, being chorio-epitheliomas. During the past year, Czerny[1] reported a case in which he excised a carcinomatous sigmoid flexure, making his incision so close to the growth that cancer was found in the specimen on the line of excision. The patient is still in good health at the end of five years. In another woman he removed a cancer of the sigmoid flexure as big as a fist which was adherent to the small bowel and had existed for two years. The excision was certainly not radical, but, nevertheless, after four years there was no indication of a recurrence.

He calls attention to the fact that esophageal cancer frequently becomes permeable after gastrotomy, and that rectal carcinoma after colostomy sometimes becomes smaller, removable, painless, and more operable than before.

A noteworthy observation is the regression of stomach tumors, which not uncommonly takes place after gastro-enterostomy, even though from all clinical and gross anatomical signs the tumor appears carcinomatous. The previously distinctly palpable tumor gets smaller or entirely atrophies, and the patient remains healthy for years.

Daniel found 11 such cases in Czerny's practice, of which 2 remained healthy over two years, 1 over four years, 1 over five years, 3 over eight years, 1 over seven years, 2 over nine years, and 1 over fourteen years. He admits the possibility that in some of these cases a benign was mistaken for a malignant condition, and admits also that he has no case to report in which the diagnosis of cancer was made from a histological examination.

Czerny reports two other cases of the spontaneous disappearance of malignant tumors. He thinks that the difference with which operative interference affects malignant tumors depends partly on the histological structure of the tumor and partly on the form of the operative interference. For example, certain tumors of the breast are very chronic, and tend to fatty degeneration and shrinkage. On the other hand, there is a soft form which grows with extreme rapidity. The cautery frequently is followed less quickly by recurrence than is an operation accompanied by hemorrhage and great depression of bodily resistance.

Clarke[2] reports the spontaneous cure of an inoperable cancer of the abdomen, diagnosticated from the histological section of removed glands. Nine years later the patient returned to the author with a trivial injury to his leg. He had no symptoms of cancer at that time, and had not had a single day's illness since he left the hospital.

These instances of the undoubted regression of cancerous growths lead naturally to the belief that certain resistant forces of the body play a large part in determining the rapidity of the growth and the spread of

[1] Zeitschr. f. Krebsforch., 1907, Bd. v.
[2] Clinical Journal, London, February 6, 1907.

a cancer. In case the natural vitality of the body resists the malignant invasion for a time, and the type of growth is of a lesser malignant nature, various anti-bodies might form which would be sufficient to check the epithelial proliferation.

Treatment of Cancer. While there have been no papers during the past year from the prominent advocates of a radical operation, the best surgical plan, in my opinion, is what I have expressed before, viz., as wide a local removal of the growth as possible. Mackenrodt and others have not retracted their views that extirpation of the glands is a valuable adjunct of every cancer operation, and until they make an announcement to the contrary it to is be taken for granted that they still pursue this method.

Among the recently gained adherents to the abdominal operation in preference to the vaginal is Veit.[1] He has had much success, and believes that abdominal hysterectomy for cancer is the best operation. The end results are better and the mortality is no greater after more or less perfection in technique has been attained. He has operated on 24 consecutive cases without a death. Spinal anesthesia is preferable to chloroform and lessens the death rate. With increasing practice in the performance of the operation his percentage of operable cases has grown larger. Of 46 cases of cancer applying for treatment during the past year, 37 were submitted to a radical operation.

Heinricius[2] saw 358 patients with uterine cancer from 1862 to 1906. This number was 4.3 per cent. of his total gynecological material. There were 44 cases in which he performed the radical abdominal operation. Recurrence occurred in 20 cases, and 7 died soon after the operation. Recurrences were usually located in the connective tissue surrounding the uterus.

Henkel[3] shows that in the overwhelming majority of cases, recurrences of cancer after hysterectomy are in the vagina and the parametrium, and extremely seldom in the glands. He believes that metastatic cancer in lymph glands may undergo regression after the original tumor is removed. Whenever, during an operation, the lymph channels are divided, it is possible for cancer cells to be transplanted into the open vessels. Only in those cases in which a careful examination under ether shows a positive participation of the glands should these be removed. Abdominal section will then be required. During the removal of glands one should take the greatest care that the capsule is not broken. If such an accident occurs, on account of the possibility of implanting the cancer cells in the wounded tissue, there is far more danger to the patient than if the glands were let alone entirely.

If the cancer is confined to the uterus, or if its advancement into the

---

[1] Berl. klin. Woch., 44, 25, 768.   [2] Jour. Amer. Med. Assoc., 49, 1409.
[3] Zeit. f. Geburtsh. u. Gynäk., p. 466, 1907.

parametrium is plainly circumscribed, Henkel prefers vaginal extirpation of the uterus by means of a cautery knife and with the help of Schuchart's incision. In doing this, the author removes a considerable part of the vagina, clamping the anterior and posterior vaginal wall together over the cancerous area, against which a tampon of formalin is placed. In cases of extensive infiltration of the pelvic connective tissue, where it is hard to determine positively whether the infiltration is carcinomatous or inflammatory, laparotomy is necessary, for in this way the parametrium can be more thoroughly removed from the pelvic wall and the bloodvessels more exactly controlled.

As it is always desirable to determine the exact extent of a cancer of the cervix on which an operation is contemplated, the following observations of Barringer[1] on cystoscopic examination of the bladder are interesting.

He says: In the early stages of carcinoma cervicis uteri, where the carcinoma is probably confined to the cervix, cystoscopic examination is of little use other than to determine the presence or the absence of a cystitis. In cases of carcinoma cervicis uteri which involve at all the anterior or the lateral vaginal walls, the most accurate means of ascertaining the condition of the vesicovaginal septum is by means of cystoscopic examination.

Cystoscopic examination includes an estimation of the direction of the urethra and the position of the trigone, a marked elevation of the trigone meaning almost always an inoperable carcinoma. Conditions within the bladder which may be encountered are: tumor masses encroaching upon or causing retraction of the bladder; alterations of the bladder which are similar to those occurring with vesical or paravesical inflammation, such as a folding or a swelling of the bladder mucous membrane, varicosities of the bladder vessels, submucous hemorrhages, congestion, cystitis, and bullous edema. The most important among these conditions within the bladder which indicate cancerous involvement of the vesicovaginal septum are: tumor masses encroaching upon or causing retraction of the bladder, folding and swelling of the bladder mucous membrane, and marked varicosities.

Aside from ascertaining the condition of the vesicovaginal septum, cystoscopic examination is important in revealing any inflammatory conditions of the bladder, as cystitis, etc., which, if unrecognized and untreated before, might be the determining factor in a failure of the operation. This examination becomes progressively more important the nearer the growth approaches the borderland between operative and non-operative cases.

RESULTS OF OPERATION IN THE TREATMENT OF CANCER. No large series of cases of cancer of the cervix have been reported during the past year.

[1] Medical Record, May 18, p. 805.

11

The latest and most reliable statistics remain those of Wertheim and Mackenrodt, which I reviewed several years ago. The result of operation in cancer of the cervix on the whole is rather disappointing. The best results in a large series of cases show no more cures (five years) than 11 per cent. of the number of cases applying for treatment. It is interesting to compare this result in cancer of the cervix with that obtained in cancer of the breast.

Greenough, Simmons, and Barney[1] report that of 416 cases of primary operation for *cancer of the breast* at the Massachusetts General Hospital, from 1894 to 1903 inclusive, 376 were traced to a conclusive end result at an average period of eight years after operation; 64 cases were alive and well and 7 died without recurrence over three years after operation. Counting in the operative mortality, there were 320 attempts at radical cure, 67 of which, or 20.9 per cent., were successful. During the same period palliative operations were performed on 56 patients, 15 per cent., and 52 cases were discharged untreated. Seventeen out of 88 cases, or 19 per cent., of those passing the three year limit without evidence of recurrence, showed a recurrence later, and 4 cases developed a recurrence six years or more after the operation.

If the number of cases applying primarily for treatment and the number cured after five years were reckoned, it might be seen that the results of surgical intervention in cancer of the breast are scarcely better than in cancer of the cervix.

In giving a prognosis in a given case of cancer of the cervix, the exact location of the growth, the condition of the patient, and the histological variety of the tumor must be considered.

Montgomery[2] says that experience has taught him to give a very unfavorable prognosis when cancer of the uterus appears prior to the age of forty years. Possibly the hopeless outlook is in part due to the greater activity of the lymphatic system, the vessels of which decrease in size and number with the advent of the climacteric.

Olshausen, cited by Henkel,[3] has divided carcinoma according to the prognosis from operation into five classes:

1. The most favorable cases of very early carcinoma, commonly limited to one lip and superficial.

2. Cancer a little further advanced, but not beyond the border of the cervix, that is, the bladder, vagina, and parametrium free from cancer.

3. Cancer even further advanced, the removal of which, at least from macroscopic appearance, is possible through healthy tissue.

4. Cases in which there is a likelihood that not all of the diseased part is removed by operation.

5. Cases in which the operation is of necessity incomplete and some of the cancer is left behind.

[1] Surgery, Gynecology, and Obstetrics, vol. v, p. 49, 1907.
[2] Loc. cit.   [3] Loc. cit.

Steiner[1] reports that of 175 cancer patients operated on at Dollinger's Clinic, in Budapest, 4 per cent. are alive three years after operation, and 41.25 per cent. of 80 cases five years after operation. Included in these figures are 25 and 18 cases in which the cancer had recurred but was promptly removed.

Zurhelle[2] reports that of 178 cases of cancer of the cervix, 34 per cent. were regarded as operable; 14 per cent. have been cured over five years. Of 33 cases of cancer of the body, 75 per cent. were operable and 36.3 per cent. were cured for more than five years.

NON-OPERATIVE TREATMENT OF CANCER. *Trypsin Treatment.* At the present time the most-talked-of method among the non-operative plans of treating cancer is the one proposed by Beard.

He has recently said (loc. cit.) that the proper scientific treatment of cancer is the enzyme or pancreatic one. If trypsin alone be used, bad symptoms very soon arise which simulate the vomiting of pregnancy and eclampsia. Trypsin alone is a very deadly remedy for cancer, the reason being that in killing the cancer albumin this enzyme does not split it up into simple, harmless products. The products of the action of trypsin may vary with the amount of the injection and with its strength. At any rate, some of them are rank poisons to the organism, and they lead to nausea, vomiting, pain in the back, drowsiness, high arterial tension, albuminuria, edema, etc., and even to convulsions. The cause of such symptoms, and of the eclampsia of pregnancy, did not long puzzle the embryologist, who perceived that it was the absence of the complementary ferment, amylopsin, which induced them. Nature had committed a grave error in omitting amylopsin from fetal blood, and in relying solely on trypsin. In normal gestation, if anything went wrong with the maternal pancreas gland, and if the maternal supply of amylopsin became diminished or ceased, then serious symptoms were bound to follow. To Beard's knowledge, injections of amylopsin have not yet been given in any case of eclampsia; but they have, whenever used in cases of cancer, removed all the bad symptoms named.

The preparations employed in the enzyme treatment of cancer should be potent extracts, scientifically prepared from the fresh gland direct. The trypsin injections must contain all the enzymes and be especially rich in trypsin and amylopsin. The injection of amylopsin is to be used at any time to meet and remove the bad symptoms, and in the later periods of treatment, when all the cancer albumin has been destroyed, it must be an extract of the pancreas gland free from trypsin.

Trypsin and amylopsin are not intended for use against benign tumors, for these are composed of real or somatic tissues, and are not

[1] Deutsch. Zeitschr. f. Chururgie, vol. lxxxii, Jour. Amer. Med. Assoc., 48, 18, 1554.
[2] Archiv f. Gynäk., vol. lxxxiii, Nr. 1, p. 246.

killed or broken up by trypsin. Owing to this, the injections furnish a chemical test of the true nature of a tumor, whether it be benign or malignant. Thus some pathologists look upon adenomata as benign, or at all events as only potentially malignant. To Beard s mind they are "imitation tissues," and he should anticipate that any and every adenoma would yield to the chemical test.

Von Leyden and Bergell[1] found that nearly every case of cancer of the stomach, when not far advanced and when still free from metastasis, was favorably influenced by trypsin, and no increased growth occurred during the time the injections were being given. Von Leyden believes the ferment has an actual specific, destructive power.

Morton[2] reports a case of the apparent disappearance of a tumor nodule under the use of trypsin. The particular nodule was not examined microscopically, but it was clinically absolutely identical with other growths removed from the same case and known positively to be cancerous.

Graves[3] reports this experience with the use of trypsin, and he concludes, as a result of his investigations, that a discrete cancer node systematically attacked by injections of trypsin shrinks and becomes hard and fibrous or disappears. Neighboring nodes are little if at all affected, and are probably influenced only when the trypsin comes into actual contact with the growing cells.

The treatment of the given node, causing it to shrink or disappear, does not prevent the appearance later of another node in immediate proximity to it. There is no evidence in these cases to show that trypsin affects cancer cells by circulating in the blood, or that it affects them in any way except by direct contact.

The internal administration of the various ferments of the pancreas is of benefit to cachectic patients, but from Graves' experience there is nothing to show that this benefit is due to anything else than the assistance given to the intestinal digestive secretions of the individual patient. The direct action of trypsin on growing cancer cells, as shown clinically and microscopically, is a sufficient warrant to continue the treatment in inoperable cases, especially in view of the fact that there are apparently no serious results that can occur from its use. In some hands, at least, the value of the trypsin treatment has been grossly exaggerated.

The editor of the *Journal of the American Medical Association*, 49, No. 21, p. 1779, calls attention to the fact that a case of carcinoma treated by trypsin, reported in a popular magazine as cured, died less than four months after the alleged cure, and an autopsy showed the body literally riddled with the malignant disease. The author of the magazine article, C. W. Saleeby, is accused by the medical editor of the New

---

[1] Zeitschr. f. klin. Med. vol. lxi, Nrs. 3 und 4; Jour. Amer. Med. Assoc., 48, 18, 1556.

[2] New York Medical Journal, March 9, 1907.

[3] Boston Medical and Surgical Journal, January 31, 1907, p. 129.

York *Sun* of suppression of the truth, not only in this case but in another one.

Bainbridge,[1] in regard to statements concerning the benefit derived from the use of trypsin, reports a case in detail which had recently been reported as cured. It shows that in the study of cancer, more perhaps than in any other field of research today, there is need for suspended judgment and the cultivation of that enthusiasm for truth, that fanaticism for veracity, which ought to be brought to bear on all questions involving human life.

Whether the trypsin theory is accepted or not, let the trypsin treatment have a fair scientific test. While it is being tested let there be suspension of judgment. When the evidence is correlated and the final verdict is rendered, if it is favorable, let it be accepted; if adverse, then on to the next.

Relative to the remark of Graves, that trypsin given internally did good simply by assistance in digestion, it is in place to note the belief of Copeman,[2] who thinks that possibly a useful effect of trypsin may be found in the temporary stimulation of intestinal digestion which it produces. As a result of his own observations, not only in cancer of the stomach, but in cancer of other parts as well, there is a diminution or absence of hydrochloric acid in the gastric juice. This is quite opposite to the case in cancer mice. He has examined a large number of the latter and found a decided increase, sometimes amounting to as much as 50 per cent. The diminution of hydrochloric acid in the human may afford a reasonable explanation of the profound nutritional disturbance often associated with the late stages of cancer.

He and an assistant have examined the gastric contents in mice not having cancers, in non-ulcerating cancer mice, and in ulcerating cancer animals. They found on an average a decided increase of physiological hydrochloric acid in the stomachs of non-ulcerating cancer mice and ulcerating cancer mice. The increase amounted in some cases to 50 per cent.

Bashford has suggested that the increase in the amount of hydrochloric acid in mice is to be regarded as a compensatory response to the needs of the mouse plus a tumor, the increase of hydrochloric acid being required for the digestion of an increased amount of proteids which is needed for the continual production of new tumor cells.

The author is making a trial of Metchnikoff's lactic acid milk, the living acid-producing bacilli of which are capable, according to this distinguished investigator, of gradually supplanting the preëxisting bacterial flora of the intestine to such an extent that, as the result of their vital activity, the usual alkaline reaction of the feces gradually tends to become neutral or even faintly acid. He adds that this "bacterial junket" has a high nutritive value, is readily digested, and in a case of

---

[1] Buffalo Medical Journal, August, 1907.   [2] Loc. cit.

advanced cancer of the stomach proved to be practically the only food capable of being assimilated.

The action of trypsin on cancer may be insignificant compared to that of a liver extract used by von Leyden and Bergell.[1] They assert that an extract from the liver which they have used has an actual destructive action on cancer. Its effect is so rapid and extensive, and poisons are generated in such amounts, that at the present time the method cannot be used therapeutically. The action of the liver extract on living cancer is very much more powerful and selective than that of pancreatic extract. The constant, unrestricted growth of cancer is probably due to a lack or an inadequate supply of a specific hydrolytic force present in the normal organism. The total or partial lack of this substance explains the unchecked growth of the cancer. As the cancer grows, it consumes this substance still more rapidly. The liver extract used in their experiments was obtained fresh, by pressure, from the ground liver of animals.

TREATMENT OF CANCER BY THE INJECTION OF EMBRYONAL TISSUES. Engel[2] calls attention to the return to embryonal conditions noted in the blood-forming organs after the embryonal stage is over. In adults, for example, he says the spleen, liver, and the bone marrow may resume their blood-producing activity in case of certain diseases—anemia, congenital syphilis, and infections. If this return to embryonal activity should affect not only the blood-forming cells, but also the connective or the epithelial tissue, a great and unrestrained proliferation would be possible and this would result in malignancy.

He thinks there is a check on the proliferation of embryonal cells exercised by the decidua during pregnancy. If the physiological check is taken away, a malignant condition may ensue. He mentions the work of Schöne, who has demonstrated in mice that embryonal tissue has a disturbing influence on cancer, and says that Haaland asserts that pregnant mice can scarcely be infected with mouse cancer. Engel suggests that the use of young human embryos may have an immunizing and possibly a curative effect on cancer in man.

Schöne reports from Ehrlich's Experimental Institute, at Frankford, that he is able to produce immunity to epithelial mouse tumors in mice, by injecting them with the tissues of mouse embryos. He says that Bashford has succeeded in conferring immunity by the repeated injections of normal mouse embryonal tissue. This immunity to mouse cancer cannot be called specific, and cannot be ascribed to the action of parasites or of the products of their metabolism.

CANCER SERUM. Since 1902 von Leyden[3] has been using a serum for the cure of cancer. He reports the result in three cases. In the

[1] Deutsch. med. Woch., 33, 23; Journ. Amer. Med. Assoc., 49, 7, 630.

[2] Berlin. klin. Wochenschr., xliv, No. 40, p. 1274; Journ. Amer. Med. Assoc., 49, 20, 1726.

[3] Zeitschr. f. Krebsforsch., 1907, p. 161.

first, a woman aged sixty-four years, the cancer serum was used after abdominal section in which an inoperable tumor of the pylorus was found. The patient gained twenty-three pounds from January to July, improved considerably in general health, the symptoms subsided, and the abdominal tumor was no longer palpable.

In the second case there was an operation done in 1902 for cancer of the left breast. At the time of admission there were symptoms of a metastatic cancer of the vertebra. The serum was used in 1905, the patient improved, and has continued in a fairly good state. The third case was admitted July, 1906, with a recurrence of carcinoma of the pelvis. After the fourth week of the treatment there was an apparent and progressive improvement, and the pelvic tumor became smaller.

Mackay[1] reports a case of advanced carcinoma of the breast, complicated by pleural effusion. A great improvement in the patient suddenly occurred, associated with the resorption of the pleural effusion. Mackay suggests that in this case the pleural effusion contained a serum which, when absorbed, cast into the blood a number of anti-bodies producing a regression of the cancerous growth. The improvement began on the December 28, 1906, and the article was based on the patient's condition on February 11, 1907. Nothing is said of the patient's health at present.

BIER'S TREATMENT. Bier[2] found that the injection of from 10 to 20 c.c. of a defibrinated pig's blood into pathological tissues caused a local inflammation which reached its height on the third day and then gradually declined. On injecting the blood directly into a cancer, the enlargement of the tumor was checked, there was occasional breaking down, and in some instances he thought a cure had been effected. When the tissues were examined microscopically, however, tumor cells were found. He has not a single undisputable cure to report by this method.

SUNLIGHT. Widmer[3] reports the cure of leg ulcers, suppurating glands, tuberculous fistulæ, and multiple decubitus by direct exposure to the sunlight for from one to three hours a day. A tumor giving all the clinical appearances of an ulcerating cancer, on the back of the hand, was cured by a daily exposure to sunlight of four or more hours a day, from January to April.

The patient was eighty-one years old. Not a trace of the growth was left in April, although at the beginning of the treatment it was 6 cm. long, and several cm. high, and covered with a fetid discharge. No other internal or external treatment was used during this time.

The place occupied by the tumor exhibits a pink color, and is covered with skin which is not closely attached to the tissues beneath. The author has constructed a special but simple apparatus for concentrating the sun's rays in carrying out this treatment.

---

[1] British Medical Journal, July 20, 1907, p. 118.
[2] Deutsch. med. Woch., 33, 29; Jour. Amer. Med. Assoc., 49, 12, 1062.
[3] Münch. med. Woch., 54, 13, p. 619.

Bovée[1] draws attention to the fact that Adamkiewicz claims to cure cancer by the administration of trimethylvinyl ammonium, and says that it has a physiological effect similar to that of the toxin of a cancer parasite. He thinks that cancer may be killed by its own poison, like a person by his own carbonic acid.

THE TREATMENT OF TUMORS BY INJECTIONS OF BACTERIAL TOXINS. Beebe and Tracy[2] report the result of the treatment of experimental tumors with bacterial toxins. They treated nine animals and kept graphic records of the tumors throughout the course of the experiments. They used combinations of the toxins of the Bacillus prodigiosus, the Streptococcus pyogenes, the Staphylococcus pyogenes aureus, and the Bacillus coli communis.

They say that the result of this preliminary study certainly demonstrates the destructive action exerted on tumor cells of this type (lymphosarcoma in dogs) by mixed bacterial toxins. Such action, while chiefly local, is apparently also general, for it was repeatedly observed that tumors at a distance from the site of injection underwent regression simultaneously with those inoculated, while in one instance the entire treatment was by inoculation at a distance from the tumors.

On the other hand, when the soluble toxins alone of prodigiosus were used, a systemic effect only was obtained, the toxins in a soluble condition being apparently too rapidly removed from the site of inoculation to bring about any local reaction, and no effect whatever was produced on the tumors.

One can only theorize concerning the mechanism of the reaction, systemic and local, when it does occur. It is conceivable that the tumor cells have acquired their power of uncontrolled multiplication at the expense of other properties, including that of self-defence. They may, therefore, be more susceptible to the destructive action of these chemical poisons than are the normal body cells. Furthermore, the absorption of such dead tumor cells may give rise to some sort of an antibody. In this way the resistance of the animal against tumor cells not yet destroyed by the toxins is raised.

Regarding the action of the mixed toxins, Coley remarks that all of his successes, as well as those of other surgeons, have been obtained with the combined toxins, not a single successful case having been observed from the use of the erysipelas toxin alone. This goes far toward establishing the importance of the Bacillus prodigiosus. This bacillus possesses highly toxic properties, and exerts in itself a decidedly destructive influence.

EXTRACT OF THYMUS GLAND. Gwyer[3] reports a case of inoperable cancer treated with an extract of the thymus gland. There was great

---

[1] Loc. cit.   [2] Journal of the American Medical Association, 49, 18, 1493.
[3] Annals of Surgery, July, 1907, p. 87.

relief of the symptoms. The patient first noticed the cancer in the left breast in 1899. The second operation was performed in 1906. Recurrence seems to have taken place immediately; she was treated for about three months with the *x*-rays without result.

At the first visit, April 1, 1907, she had great pain, many enlarged glands in the axilla, above and below the clavicle, and marked swelling in the shoulder and arm. The treatment was given until April 25, 1907. On that date her temperature, which had been normal, shot up to 102°, and continued elevated until May 4, 1907, reaching at times as high a point as 104°. It then subsided and became normal. A peculiarity of the pulse noticed was that it at no time ran above 90, and was always of good character.

During the period of fever, about nine days, there was a continuous diminution in the size of the glands. At the time the report was made, May 8, 1907, the patient was nearly free from pain; she was slowly regaining her appetite and strength; the enlarged glands had mostly disappeared, there was no swelling of the arm or shoulder regions; she had lost ten pounds in weight in ten days.

The thymus gland is either dried and ground to powder, or a watery extract of the nucleoproteids and the other elements is made. The dose of the powder varies from 1 to 4 drams three or four times a day, with sodium phosphate, half an ounce a day, for eliminating purposes. Meat was permitted sparingly, but milk, eggs, starches, sugars, and some fats were allowed in the diet. The author recalls several other cases, all of which seemed to be favorably influenced by the treatment.

THE USE OF CAUSTICS IN THE TREATMENT OF CANCER. While it is unquestionable that an early diagnosis and prompt surgical removal offer the best hope for the cure of cancer, so many suggestions have been offered for inoperable cases, and so many plans have been proposed for use in conjunction with operation, that there is some interest attached to a method of treatment by means of a caustic paste.

The advocate of the treatment is W. E. Brown,[1] whose paper was read before the Berkshire (Mass.) District Medical Society and the Medical Association of Northern Berkshire, at a joint meeting in December, 1906.

Although the use of a cancer paste is more or less indelibly associated in one's mind with charlatanism, the author must have some standing in his community or he would never have been invited to address the body which he did. I should strongly urge no one to accept his methods in early cases. In advanced ones, I should be inclined to give his method a trial.

After twenty-five years' experience in the treatment of malignant growths with escharotics, Brown thinks that he has a method which has affected permanent results in all forms of cancer situated outside

[1] Medical Record, May 18, 813, 1907.

of the thoracic and the abdominal cavities. He admits that this assertion may seem presumptuous. He was encouraged to enter this field of practice by the successful removal of a tumor from the roof of his father's mouth which had been operated on and otherwise unsuccessfully treated many times.

He believes that cancer presents enough diagnostic features to enable a clinician to readily differentiate it from a benign growth. As a rule, it strikes persons who are otherwise in perfect health. In its incipiency it never presents premonitory symptoms, either local or general. In short, it is a disease of health. This seems paradoxical, but it is nevertheless true. It is conceded by all that cancer is primarily a local disease, and curable if the last vestige can be removed. There are but two methods today by which early growths can be removed—the knife and escharotics.

In his experience, the author has found that the most actively hygroscopic escharotics produce the most perfect granulating surfaces, and he prefers, in combination, potassium hydrate and zinc chloride (granular). These are easily applied, both to the skin and to the mucous membranes.

He describes in detail the method of making a paste from the chemicals. Both are used in as nearly saturated quantities as possible; this produces a degree of anesthesia in the tissues attacked, rather than pain. One notable point, as he calls it, in the action of these escharotics is that when they are applied to any given tissue they cut off all circulation and completely occlude the lymph vessels; the latter in his opinion are the main channels for the dissemination of cancer.

The technique of his work in all cases is first to outline the growth by palpation, seeking its most distant ramifications. He then makes an application completely covering the entire growth, and extending the application in all directions, as far beyond its most remote infiltrations as the situation of the growth will admit of doing, never with any regard for conservatism. The application varies in thickness according to the depth and the consistency of the growth, gradually thinning toward the outer border, using care to have as much symmetry as possible, and leaving a clean-cut edge.

The paste is covered by a piece of lint the exact size of the area. Just beyond the lint, on the healthy tissue, a heavy petroleum salve is applied. The application is then covered with a thick layer of absorbent material, sufficient to catch and hold the watery discharge. If this is not done the escharotic liquid will gravitate and destroy whatever tissue it reaches. Such an application will do its work in from fifteen minutes to five hours, varying with the nature and the size of the growth and the resistance of the skin of different patients. During the time the application is in place the patient should be kept quiet, particularly when the growth is extensive.

After removing the application, in from fifteen minutes to five hours, the affected and destroyed tissue will appear pulpy and gelatinous. The pain, which is very slight, but spoken of differently by each individual, immediately subsides without the slightest soreness, swelling, or inflammation. Even in extensive cancers this is absolutely true, and the patient sleeps the first night without the use of an opiate. On the following day an application of zinc chloride is made in exactly the same manner as the potassium, except that the zinc is not extended to the point of contact with the healthy skin. If care is taken to make the application within this limit there will be absolutely no pain. The zinc chloride hardens and contracts the ulcer made by the potassium, causing more or less tension of the edges according to the extent of the growth. This traction causes inconvenience, not pain, and the sensation is probably what has lead to the term "drawing plasters."

The eschar exfoliates in from four to twenty-one days, leaving a smooth and perfectly healthy granulating surface. It is not sensitive to touch. Before exfoliation of the eschar, there are marked signs of healing around the edges. These edges are so far wide of the diseased area, that should there have been a failure to reach all of the disease in the deeper tissues it will be discernable to the eye and easily felt by the finger, the cancer cells having a decidedly hard and shot-like feel, like metastatic growths that appear in the skin surrounding advanced cases of carcinoma.

For such a condition, repeated applications of the zinc are made, the applications causing no pain, and not retarding the healing process. The wounds are protected by a thick petroleum product of a high melting point, so that it is not absorbed, and air is excluded. If the granulations become exuberant, they are treated by another application of zinc. The time necessary for healing varies from two to sixteen weeks in early cases.

The doctor exhibited seven cases and reported the history of an eighth to illustrate the value of his method.

X-RAY TREATMENT OF CANCER. Clairmont[1] has described a variety of epithelioma which he asserts is especially amenable to treatment by means of the *x*-rays. It is a form which develops from the basal cells of squamous epithelium.

In the treatment of cancer, Witherbee[2] advises: enucleation of the growth and the removal of the involved glands; non-closure of the wound, leaving it wide open, and allowing it to heal by granulation; and treatment of the open wound with the *x*-ray.

The advantage claimed for his method is perfect drainage of all the lymphatics and the tissues in the infected region, and the changing of a deep or a subcutaneous cancer into a superficial one. This permits

[1] Loc. cit.   [2] Jour. Amer. Med. Assoc., xlviii, 25, 2114.

the x-ray to more thoroughly destroy the cells as they are brought to the surface.

Morton[1] reports a series of cases in which the use of the *pure radium salt* had a decidedly beneficial action in cancer. He believes that radiation should precede every operation for cancer. In epithelioma of the face, in cancer of the breast, or in sarcoma of the skin, the case may go on to a complete cure without any surgical interference. If, after six weeks to two months, operation is necessary, it may then, in his opinion, be performed with a greatly diminished prospect of recurrence, or, what is equally of importance, the area of operation may be reasonably limited.

Strebel[2] in 1903 advocated the introduction of radium inside of a tumor as a routine procedure in the radium treatment of cancer. He has since that time devised a small x-ray tube to be used in the same way.

Lewisohn[3] relates his experience in the treatment of malignant tumors by means of the x-rays in Czerny's clinic. He reports 30 cases which were x-rayed for some time, and whose further course was observed. Among them were 11 cases of breast cancer, 5 cases of osteosarcoma, 5 cases of lymphosarcoma, 5 of epithelioma, 4 of melanosarcoma, 2 of gastro-enteric cancers, and 1 case of malignant parotid tumor.

In drawing conclusions from his results, he says that he cannot find a single instance of a permanent cure. Besides brief improvement, the rays accomplished some subsidence of pain, and in the ulcerating form some drying up of the secretion. He draws attention to the fact that the material on which he worked was very unfavorable, most of the cases which he reports having been recurrences after primary excision, or inoperable cases.

He thinks it advisable to report his results, however unfavorable, so that too much will not be expected of the x-ray. It is his opinion that most of the cases spoken of as "cures" following x-ray treatment would not stand searching criticism.

TREATMENT OF INOPERABLE OR RECURRENT CANCER. Gellhorn[4] argues that the unfortunate victims of inoperable cancer should enlist the attention and energy of the profession to secure improvement in the treatment of such cases. He thinks that the x-ray has been disappointing, and that the much-heralded trypsin treatment has not come up to its promise. The soundest suggestion of recent years, to his mind, was undoubtedly that of Lomer, who advised curettement and cauterization at regular intervals of four weeks. Lomer's plan, unfortunately, cannot be easily carried out and practised, for patients will not submit to these periodical operations.

[1] Med. Record, November 9, 1907, 760.   [2] Münch. med. Woch., liv, 11, p. 527
[3] Zeitschr. f. Krebsforsch., Band v, 1907.
[4] Jour. Amer. Med. Assoc., xlviii, 17, 1400.

Gellhorn treats inoperable cases in the following way: The cancerous area is thoroughly curetted; the excavation is then carefully dried with cotton sponges, and from one-half to one ounce of acetone is poured into it through a tubular speculum. For this purpose the pelvis of the patient must be raised as in Trendelenburg's position.

The anesthesia may now be interrupted and the patient left in this position for fifteen 'to thirty minutes. Next, the acetone is allowed to run out through the speculum, by lowering the pelvis of the patient, and the cavity is packed with a narrow strip of gauze soaked in acetone. The vagina and the vulva are cleaned with sterilized water and dried.

After this first treatment an application of the acetone is made two or three times a week, beginning the fourth or the fifth day after the operation. This may be done without anesthesia. With the gradual contraction of the cancerous cavity, smaller specula are employed. The speculum is filled with acetone and held in place by the patient's hand for one-half hour, and is then emptied in the manner described above.

The immediate effect of the treatment is as follows: Any slight oozing is checked almost instantly. The surface of the curetted area is covered with a thin whitish film wherever there was an extravasation of blood. On the vulvar mucosa and the outer skin and anus acetone produces a faintly white discoloration, which soon disappears. There is no pain from the cauterization, save a slight stinging sensation if the acetone has touched the skin. It passes away rapidly if the affected parts are washed with cool water.

By this treatment there is a marked reduction of the foul odor. The discharge becomes at first more watery, and gradually disappears. The hemorrhages fail to recur. Gellhorn has, after two or three weeks of the treatment, noticed a considerable diminution in the cancerous excavation. Its walls become smooth and firm. There are no more polypoid excrescences and no friable tissue.

Acetone has intensely hygroscopic qualities, and shrinks tissue so rapidly that if sections are left in it for more than half an hour they are too hard for the microtome. Gellhorn reports two cases in which he has tried the treatment outlined above with very good results. He recommends.it to others.

Henkel[1] believes thoroughly in a curettage of recurrences, followed by cauterization. He says that Czerny, a year and a half after operating in this way on a cancer of the cervix, noticed a regression of the growth, and was then able to operate radically. The second operation revealed a myoma, but no vestige of the cancer could be found in the specimen. Lomer has had a case in which, some time after such a palliative operation, the uterus became movable, and was extirpated. Fraenkel saw 6 cases of uterine cancer cured by cauterization with chloride of zinc. Simms

---

[1] Loc. cit.

reports a woman in good health five years after palliative treatment, and Klotz 6 cases in which the patients remained well over four years. Blau has reported 14 cases in good shape for three years after operation.

If it is decided to treat recurrences, patients should be asked to return every ten to fourteen days after operation. This is the only way to catch them early. Ischial neuralgia after hysterectomy for cancer is often indicative of a recurrence.

The treatment which Henkel advises in cases of inoperable cancer is to thoroughly scrape away the exposed cancerous tissue by means of a sharp spoon, and, after temporary tamponade for hemorrhage, to apply formalin, chloride of zinc, or tincture of iodine. After the slough has separated, the base of the ulcer should be carefully exposed with a speculum and a new slough made by means of a cautery. The patient must be kept under continual observation, so that the cancerous ulcer can always be controlled and repeatedly burned if necessary.

Weindler[1] reports three patients who have apparently been cured of inoperable cancer of the uterus by a thorough excochleation and cauterization. After thorough curettement the cancerous excavation was seared with the actual cautery and swabbed with pure carbolic acid.

The ages of the patients were forty-six, forty-nine, and fifty-one. All were of spare build. At the present time, five and six years after the palliative operation, the patients feel entirely well, perform their regular duties, and no evidence of the previous trouble remains save the scar.

The diagnosis of the malignant condition was confirmed microscopically.

The effect of double oöphorectomy upon inoperable cancer is reported by Clarke.[2] He mentions the case of a woman who had cancer of the breast. She first noticed a lump in her right breast in 1890; in 1896 the growth was removed, and on microscopic examination he found it to be a cancer; in 1897, after previous refusal, the patient consented to a Halsted operation. Both pectorals were taken away, and every vestige of the active tissue was extirpated from the region of the axilla; in the same year a supraclavicular gland was removed; two months later the whole contents of the posterior triangle were carefully dissected out, and on January 19 the clavicle was divided, and some more enlarged cancerous glands were removed from the posterior triangular space.

In November, 1899, she begged for something to be done to relieve her pain. More glands were visible in the neck. The neck and arm were swollen and painful, and there were a large number of secondary growths on the side of the chest. They had invaded the upper part of the abdomen, but they did not pass across the middle line of the body. There was, however, no evidence of a visceral invasion.

[1] Centralbl. f. Gynäk., 1907, Nr. 22, p. 632.
[2] Clin. Jour., London, February 6, 1907, p. 264.

She was now forty-four years of age, and her menstruation was still quite regular. A double oöphorectomy was suggested to her, and she consented readily to its performance. Within forty-eight hours after the operation her pains ceased, and before she left the hospital, a month later, the thickened and edematous skin had begun to shrivel. The shrivelling process continued, and in two months she reached her present condition.

All swelling has disappeared from the right arm, which she again uses perfectly. The secondary nodules have all disappeared, except a few on the side of her neck and one or two along the incision line of the old breast operation. There is not a trace of any other of the secondary growths to which the author alluded, and there have been none from February, 1900, up to the present time, 1907. The few that remain are certainly smaller than they were. An examination of one of these nodules, much to Clarke's surprise, found one of the most typical, clearly defined cancerous growths he has ever seen. In other words, the cancerous growth is still there, and will one day, he fears, take a fresh lease on life and grow. He thinks that there was a distinct connection between the removal of the ovaries and the arrest of the cancer. He has tried a dozen cases in a similar way, and in every one of them there has been more or less abatement of the symptoms, but in none has the arrest been so marked or of so long a duration. He draws attention to this procedure merely as an additional ray of hope for inoperable cases.

THE RELATION BETWEEN THE SIGMOID FLEXURE OF THE COLON AND THE PELVIC ORGANS IN WOMEN.

Albrecht[1] speaks of the importance of the sigmoid flexure in its relation to the female genitalia.

He notes, first, the four principal types of this part of the intestine as given by Kelly. Attention is drawn to the fact that the position of the part is almost constantly changing, on account of a more or less extensive mesentery, alternate distention and contraction of the gut, the influence of intra-abdominal pressure, and the pressure from the surrounding organs.

In early life the sigmoid, as a rule, is of extraordinary size. Later, in consequence of a relatively greater increase of the rest of the body, this is equalized. The infantile relation may persist, and then the sigmoid may be monstrous, reaching a length of from 80 to 110 cm.

There is some connection between the mesosigmoid and the infundibulo-pelvic ligament on the left side, just as there is a connection between the meso-appendix and this ligament on the right. There is

[1] Archiv f. Gynäk., lxxxiii, Nr. 1, p. 171.

also a communication between the pelvic connective tissue and the subserous connective tissue of the sigmoid.

The worst influence which the sigmoid has on the pelvic organs depends on the more or less constant and abnormal distention of the organ which is associated with habitual constipation. The latter may depend on congenital abnormalities either in the length or in the curves of the sigmoid. The uterus in early life has a more or less upright position in the pelvis. It is evident that the retention of fecal matter in the rectum at this time of life may push the cervix forward, and that a distention of the sigmoid, especially if the gut lies partly in the anterior segment of the pelvis, may push the fundus backward and cause a retroversion.

Once the uterus is retroflexed, the obstipation will be increased. Chronic overloading and distention of the sigmoid flexure is responsible also for failure in the operation for the correction of retroversion by a shortening of the round ligaments. The influence of constipation is also indicated by the improvement in the subjective symptoms of a retroversion which is effected by a free evacuation of the bowels.

An overloaded flexure in the left half of the pelvis may cause a prolapse of the ovary, with congestion, and an increase in the size of the organ and tenderness. Habitual obstipation, acting as a constant source of irritation, may be responsible for severe dysmenorrhea. Theilhaber also makes it accountable for some cases of menorrhagia and leukorrhea. Gottschalk says it may produce fungous endometritis.

Among the original causes of persistent obstipation, aside from the form of the sigmoid flexure, are atrophy or atony of the intestinal muscle and the intestinal nerves, weakness of the abdominal walls of the pelvic floor, tumors in the small pelvis, retroflexion of the uterus, etc.

Besides the non-inflammatory disturbances caused by a more or less persistent distention of the sigmoid, there are others associated with inflammatory alterations. As a result of the continuous presence of impacted fecal matter, a more or less deep-seated injury of the bowel wall may result, producing the clinical picture of acute or chronic sigmoiditis which may be easily taken for appendicitis or pelvic peritonitis.

The history of these cases shows chronic obstipation; there is a sudden attack of pain in the lower abdomen, with vomiting; the pain is mostly on the left side; there is fever and general malaise. An examination of the abdomen reveals slight general distention, a soft, impressible belly wall, tenderness, reflex muscle spasm and a changeable and perceptible resistance in the left lower abdomen. Pelvic examination in many cases gives no particular information. In others, diffuse infiltration and tenderness are manifest. Corresponding to the position of the distended bowel, near the uterus or back of it, a painful tumor may be felt.

The symptoms, which are cut short usually by a free evacuation of the bowels, are due to a necrosis of the mucosa, with hemorrhage and

inflammation of the submucosa. In serious cases the inflammatory process may extend to the peritoneum, with possibly the formation of an exudate or an abscess. Acute sigmoiditis may be followed by a full *restitutio ad integrum.* At other times there ensues a chronic hyperplastic inflammation of the submucosa and a chronic catarrh. Acute exacerbations may occur. The patient suffers with pain in the left lower abdomen, obstipation, and mucous stools. The pain is especially bad at the time of the menstrual periods. The disease is complicated occasionally by the formation of diverticula, which extend through the coats of the bowel into the subserous connective tissue. In this way the inflammation may extend to the peritoneum, and finally produce distortion of the bowel and adhesions between it and the surrounding organs. Gonorrheal and syphilitic inflammation of the sigmoid must not be forgotten as causes of a chronic cicatricial sigmoiditis.

When the inflammatory process advances into the mesentery of the sigmoid a condition of mesosigmoiditis is produced, which is somewhat analogous to the chronic atrophic parametritis of Freund. Mesosigmoiditis is an insidious inflammatory infection of the mesosigmoid, which heals with the formation of a scar, and through the contraction of this scar there is a shortening and a contraction of the entire mesentery. As a consequence of this contraction the limbs of the flexure are drawn closely together, resulting in mechanical obstruction, persistent constipation, and chronic meteorism. Finally, as the most important and the most serious consequence, acute volvulus may occur. Nearly all authors are agreed upon the cause of this disease, and say that it results from inflammatory and ulcerating processes of the bowel itself, which lead to a chronic inflammation of the mesentery of the sigmoid, in consequence of an absorption of toxic products through the lymphatic vessels.

Ries[1] defines mesosigmoiditis as a condition of chronic inflammation of the connective tissue as well as of the peritoneal covering of the mesentery and of the sigmoid flexure. This leads to a shrinking of the mesentery, and, as a result, a shortening of the base of the mesosigmoid.

Instead of the normal, delicate, transparent structure which forms the normal mesentery of the sigmoid, one which has undergone such a pathological change presents white bands of cicatricial tissue and has lost its elasticity to a greater or less degree. The sigmoid is, therefore, hindered in its normal free excursions, and becomes a fertile source of grave and sudden danger.

The cause of these inflammatory changes are either diverticula in the sigmoid or chronic inflammation extending from neighboring structures, particularly the rectum and the female pelvic organs.

Diverticula of the sigmoid were first described by Graser. They may

---

[1] Amer. Jour. Obstet., lv, No. 5, p. 623.

be true or false; in the beginning usually false. They follow especially the pathway of the bloodvessels on their route through the muscular coat of the bowel. Fecal matter entering these diverticula stagnates there, and may, and frequently does, lead to inflammatory ulceration and even to perforation, and as a result of the absorption of septic material from these diverticula there is a chronic inflammation of the mesosigmoid.

Virchow gave a very full description of mesosigmoiditis produced by the extension of inflammatory conditions from neighboring structures. Chronic inflammation of the rectum, associated with stricture and ulceration, may invade the meosigmoid. The parametritis chronica atrophicans, as described by Freund, was known by this author to be frequently associated with a mesosigmoiditis, the conditions in the broad ligament closely resembling those in the mesosigmoid.

The symptoms of chronic mesosigmoiditis are not, as a rule, very important; they consist mainly in constipation, flatulency, and more or less pain in the region of the sigmoid. Now and then the patients report a feeling of stiffness in the bowel, localized bloating, and acute sharp pains in this locality, but, as a rule, the symptoms are not sufficient for a reliable diagnosis, and the patients usually are classed as cases of intestinal fermentation, chronic constipation, or some such indefinite diagnosis, until some day, particularly after an indiscretion in diet, the symptoms of the intestinal blockade become manifest. These may disappear again with or without treatment, and may repeat themselves at various intervals, or they may go on to the development of a typical ileus, due to volvulus of the sigmoid, to which mesosigmoiditis has predisposed.

If an operation for obstruction is undertaken in time, that is to say, before peritonitis has set in and has covered the mesosigmoid with exudate, the mesosigmoiditis is recognized, and the entire previous history becomes illumined by the patient's condition found at the operation.

The author thinks it is a precaution worthy of consideration during operation for obstruction to investigate the condition of the mesosigmoid after relieving an intestinal obstruction high up. If mesosigmoiditis is found, prophylactic measures to guard against volvulus of the sigmoid should be adopted, such as the attachment of the sigmoid to the parietal peritoneum by sutures.

DYSMENORRHEA.

Etiology. Sellman[1] discusses some of the causes of painful menstruation in young unmarried women. He believes that any thickening of the uterine mucosa will eventually produce dysmenorrhea. Taking cold at the menstrual period interferes with the involution of the uterus and the changes which normally occur at the time of the menses, and

[1] Amer. Jour. Obstet., vol. lvi, p. 641.

thus in this way may be a cause of dysmenorrhea; shock and mental influences, imperfect or abnormal development, or any vicarious function of the sexual organs may be a cause of painful menstruation.

An imperfectly developed condition of the sexual apparatus is very frequently the source of the trouble. The same is true of malnutrition, anemia, chlorosis, and general physical feebleness. There is no doubt that exercise has a direct effect upon the character of menstrual pain, and that young women who exercise moderately suffer less than those who exercise little or not at all.

To determine the relative frequency of dysmenorrhea as a symptom connected with pelvic lesions and independent of them, Holden[1] made an analysis of a series of cases. He finds that dysmenorrhea is present in 47 per cent. of all gynecological hospital patients. In about 23 per cent. of the entire number the symptom seems to be definitely caused by certain abnormal conditions of the pelvic organs. In 22 per cent. of the entire number it is present in conjunction with such conditions, but is apparently not caused by them.

The pathological conditions to which he most frequently was obliged to attribute the dysmenorrhea were: (1) Retrodisplacement of the uterus; (2) pelvic inflammatory disease; (3) myomata. They accounted for nearly 90 per cent. of all the cases produced by pathological conditions of the pelvic organs, retrodisplacement for 41 per cent., pelvic inflammatory disease for 11 per cent.

Eighty-six per cent. of nulliparous patients with a retrodisplacement causing symptoms had dysmenorrhea. The frequency of the association leads Holden to conclude that the abnormal position caused the dysmenorrhea. In the retrodisplacement occurring after childbirth dysmenorrhea was much less common, although 25 per cent. of multiparæ with retrodisplacement had dysmenorrhea, apparently caused by the malposition.

Thirty-one per cent. of all the cases of pelvic inflammatory disease had dysmenorrhea, which was apparently caused by the condition.

Twenty per cent. of all the cases of myoma had dysmenorrhea, apparently caused by the tumor.

Treatment. In the general treatment of dysmenorrhea occurring in young women, Sellman recommends the use of the dumb-bell, the light Indian club, and the wand. He has found this practice very beneficial. He draws attention to the good results which followed the adoption of such exercises in an institution for young working women.

Besides the usual general treatment advised for dysmenorrhea, Glasgow[2] says that he has had good results from a combination of hydrastis with nux vomica. Apiol, 5 minims in capsule, or the tincture of pulsa-

[1] Surgery, Gynecology, and Obstetrics, 1907, vol. iv, p. 609.
[2] Medical Record, August 3, 1907, p. 177.

tilla, in 5-drop doses, three times a day during the week preceding menstruation, will be found useful.

Palmer[1] condemns in very strong terms the use of opiates and coal-tar products in the treatment of dysmenorrhea. These drugs may temporarily relieve the suffering, but they do nothing in a curative way, and the regular use of them often leads to the drug habit.

There are certain efficient and harmless remedies: the tincture of pulsatilla in 10 drop dose, three times a day for at least three days preceding the period, gives excellent results in the neurotic type of dysmenorrhea found in young women. It should be continued in like dose, but more frequently, during the menstrual flow if the pain persists. The tincture of *actœa cimicifuga racemosa* may be prescribed in a similar manner and for a like indication. It is beneficial in cases of apparently rheumatic origin.

The ammoniated tincture of guaiacum may be administered in milk or in small quantities of whisky at short intervals. A combination of cimicifuga, helonin, and caulophyllin in pill form three times a day during the intervals and at the menstrual period will sometimes be helpful when the dysmenorrhea is associated with a delayed and scanty flow.

Bromides are indicated in the "ovarian neuralgia" type of dysmenorrhea. Cannabis indica may be used in the same class of cases. It is certainly preferable to opium. When dysmenorrhea is accompanied by a vasomtor spasm characterized by a paleness and a coldness of the surface, nitroglycerin should be administered in 1-drop dose, well diluted, every few hours.

Much attention should be paid to general dietetic and hygienic treatment during the intervals between the menstrual periods.

TREATMENT OF DYSMENORRHEA BY ARTIFICIAL HYPEREMIA OF THE MAMMARY GLANDS. Polano[2] reminds us that because of the frequency of the affection, the treatment of dysmenorrhea is of the most importance in minor gynecology. It is, of course, irrational to confine one's attention to the treatment of the individual attacks of pain and not to endeavor to secure permanent relief by curing the underlying cause.

He says that one distinguishes, as a rule, four forms of dysmenorrhea. The first arises from a mechanical obstruction to the outflow of blood; the second is a consequence of inflammatory processes in the endometrium; the third is reflex from the ovary or an extragenital organ; the fourth is one of the symptoms of a pure hysteria.

Practically such a distinction is often impossible. A purely mechanical form must be excluded except in the very rare cases where there is an actual stenosis of the cervix. Lomer would exclude from this class also every case in which the severity of the pain varies considerably at

---

[1] International Clinics, June, 1907, p. 198.
[2] Münch. med. Woch., liv, 35, p. 1737.

different times. According to Polano's idea, this variation may depend on the amount and the coagulability of the menstrual blood, just as the size of the child's head makes a difference in the suffering incident to labor.

Although certain cases of dysmenorrhea are attributed to endometritis, the dependence of the one upon the other is sometimes doubtful; there is often no recognizable tenderness of the endometrium, and from the recent examinations of Hitchmann it may be concluded that many of the so-called cases of glandular endometritis are nothing more than physiological changes in the mucosa.

The relations of the reflex form of dysmenorrhea are even more inconstant. There is today a great tendency to regard most cases of dysmenorrhea as purely hysterical. To prove that this is not so is very hard, because, even though minor alterations are found which might account for the suffering, and even though minor operations are successful, the possibility of a cure being the result of mental suggestion cannot be excluded.

In spite of all this, every practitioner sees a considerable number of cases in which all internal treatment and all minor surgical procedures are useless. For such patients Polano recommends a new form of treatment, which is based on the antagonism which exists between the physiological function of the ovary and of the mammary gland. This relation is shown during pregnancy and childbed.

The plan in question is a modified Bier's treatment of the mammary glands. This is carried out by means of a suitable cupping-glass. The air is drawn out until the breast swells up and the patient complains of a strong drawing sensation, but not of actual pain. The glass cup is allowed to remain for about half an hour, with occasional removal and replacement. This process is started a day before the beginning of the period, and continued if possible up to the last day of menstruation.

The mammary glands show a considerable hyperemia for an hour after the treatment, a striking fulness, which is especially marked when one breast is treated. Polano gives the history of three cases in which the dysmenorrhea was relieved.

Freund[1] draws attention to Polano's recommendation in the way of treatment. He criticizes Polano's view that an increase in the activity. of the mammary gland decreases the physiological activity of the organ, or vice versa, that an increase in the ovarian activity diminishes the physiological activity of the breast.

He asks whether there are any facts which justify such a conclusion, and points out that the increase of the ovarian activity at the time of the menstrual period is often accompanied by an increase of the physiological activity of the breasts which become hyperemic and hyperesthetic, and

[1] Münch. med. Woch., liv, 43, p. 2122.

show erectility of the nipples and some excretion. Surely there is no antagonism in this, but rather coördination.

So far as the relation between the ovary and the breast during pregnancy is concerned, the ovary is not functionless at this time, and besides forming the huge corpus luteum of pregnancy, other small follicles are ripened. There is surely no antagonism between this activity and the hypertrophy of the breasts in the pregnant woman. When menstrual bleeding continues throughout gestation there is no defect in the formation of colostrum and the mucous membrane of the uterus, and the myometrium is regenerated during the puerperium uninfluenced by the increased activity of the mammary glands. If menstruation begins during lactation, the milk is not always affected to a degree worth mentioning.

Freund also draws attention to the experience of English operators, who found a spontaneous regression of cancer of the mammary gland after the removal of the ovaries. It is a well-known fact that irritation of the mammary glands, especially the nipples, causes contraction of the uterus. A sufficiently strong irritation of the nipple may cause a contraction of the uterus in a pregnant woman, and Freund has had an electrical cupping-glass made which is placed over the nipple and a suitable current applied. The method may be used to strengthen weak, or to reëxcite disappearing labor pains, and exceptionally for the production of premature labor.

This electric cupping-glass has been used for its effect on profuse menstruation, but no diminution of menstrual pain has ever been observed. The fact that an irritation of the breast would cause contraction of the uterus and reduce the amount of menstrual flow was known even to Hippocrates, and was written of by Scanzoni.

Freund thinks it would be very hard to say that suggestion has not played a large part in the three more or less successful cases which Polano has reported. The application of cups to the sacral region has acted in this way in some cases. He thinks that from Polano's treatment nothing more than a diminution of uterine hemorrhage can be expected. If, at the same time, pain is diminished, it is certainly a most happy result, but it cannot be looked upon as a direct consequence of the treatment in the sense taken by Polano.

FORCIBLE DILATATION OF THE CERVIX AND APPLICATION OF THE WYLIE DRAIN. Beyea[1] discusses the treatment of dysmenorrhea by means of forcible dilatation of the cervical canal and an application of the Wylie drain.

The form to which this treatment is particularly applicable is that which occurs in young unmarried and married women, and is characterized by violent intermittent or constant sharp shooting pain in the

---

[1] International Clinics, lv, No. 17, p. 183.

center of the lower abdomen and extending down the thighs. The pain begins several hours or immediately before the appearance of the flow or during the first one or two days. In these cases bimanual examination finds the uterus small, often infantile in shape, anteflexed to a more or less extreme degree, frequently with imperfect invagination of the anterior lip of the cervix into the vagina. Rarely there may be a genital split of the cervix, and this is also an indication of imperfect development.

The pain is in part due to obstruction of the cervical canal at the point of flexion at the internal os, and in part to an insufficiency of the uterine muscle, because of poor development, to carry out its function in the act of menstruation. This form of dysmenorrhea has comprised 98 per cent. of the cases which Beyea has seen during the last fourteen years.

It is to be understood that the cases in question must not be confused with the rare cases of ovarian dysmenorrhea accompanied by atrophic changes in the ovary, or with the dysmenorrhea dependent upon pelvic inflammation, or with the painful menstruation which is incident to profound neurasthenia. The only medicinal treatment for pain of this type which gives relief is morphine, and continual use of this is fraught with great danger. The indications in dysmenorrhea of this type are to relieve the obstruction and to develop the uterine muscle.

With this double purpose in view, Beyea carries out the technique of dilatation about to be described, and introduces a Wylie drain.

The cervix is exposed through a Sims' speculum and the anterior lip is seized with a double tenaculum. The small Goodell dilator is introduced into the cervical canal, and then the larger instrument. The operator should be sure that the dilating blades pass beyond the internal os, and that they are introduced up to the flange at the base of the blades. Dilatation is slowly increased to the point where the register at the handle of the instrument shows that the canal has been dilated to one and one-half inches. The dilatation should be very slowly and carefully carried out, consuming at least fifteen minutes, so as to amply stretch, and in no way tear or injure, the mucosa or muscle. The instrument is removed, again introduced, and for a second time the dilatation is carried to the same point. The object of the second introduction of the instrument is to stretch the muscle in another direction. The instrument is then allowed to remain in position for fully fifteen minutes by the clock. After dilatation, the vagina and the cervical canal are washed out with a 1 to 2000 bichloride of mercury solution.

A hard rubber Wylie drain is then introduced into the uterine cavity, the size of the drain being such that it requires a little force to have the bulbous part pass the internal os. Before introduction the instrument is sterilized by boiling, and while warm is bent forward into the shape of the canal of the normally anteflexed uterus, the drainage groove

being on the right lateral surface. A light gauze pack is then placed in the vagina, completing the operation.

The patient is required to remain in bed in the recumbent position for two weeks. The Wylie drain is left in position for three or six months, and where necessary, a year. During convalescence, and for as long a time as the instrument is worn, a daily boric acid vaginal douche is administered. The object of wearing the Wylie drain is to develop the uterine muscle. The top of the device is somewhat bulbous and forms a body against which the uterus contracts in an effort to expel it. In this way the muscle is exercised, the body of the uterus is enlarged, and to a considerable extent for the same reason the cervical canal is increased in caliber.

Since 1904 this treatment has been carried out in 46 women—28 single and 17 married. Replies have recently been received from 41 of these patients—26 of the single women and 15 of the married; 22 single women have been entirely relieved, 2 have been benefited, but still have some pain, and in 2 there is no improvement; 12 of the married women are completely relieved; 3 have received no benefit. In practically all of those cases relieved the menstrual period has become more regular and much more profuse; 85 per cent. of the single women and 80 per cent. of the married ones have been cured.

From a study of these cases, and after an experience of three years, it is Beyea's opinion that the result of the treatment would have in many instances been improved had the instrument been left in position a greater length of time; it often was removed at the end of two weeks. In 10 of the cases which were cured the operation of forcible dilatation had been performed previously without benefit.

The contra-indication to the operation and the use of the Wylie drain is the presence of intra-abdominal pelvic inflammation of any character, and the surgeon should be doubly assured that no such disease exists before proceeding with the treatment.

The author emphatically declares that the most rigid aseptic and antiseptic technique must be practised both in the carrying out of the forcible dilatation, and in the introduction of the Wylie drain. The instrument should never be introduced as an office treatment, either primarily or secondarily. The infection which frequently resulted from the use of the stem pessary in former days gave Beyea reason to watch his early cases with much concern. Not the slightest indication of infection occurred in any of the 46 cases. It is certain, therefore, that the treatment is absolutely safe if carried out under a rigid technique. If, after the removal of the drain, the pain returns, the device is again introduced under aseptic precautions and for a greater period.

STERILITY.

Etiology. Pincus[1] follows Schenk, and divides cases of sterility in women into three classes.

First, sterility caused by pathological alterations of a local nature.

Second, sterility caused by pathological alterations of a general nature.

Third, sterility without recognizable pathological alterations.

To the first group belong anomalies of development, newgrowths, inflammations, and functional deviations from the normal.

To the second group belong the general diseases of the body, with consecutive, temporary, or permanent changes in the genital organs. For example, chlorosis with its consequent atrophy and hypoplasia of the uterus, the different forms of anemia, diabetes, Basedow's disease, myxedema, tuberculosis, alcoholism, morphinism, etc. Onanism plays a considerable rôle in feminine sterility. In high-grade cases it leads to an atrophy of the ovaries, with its consequent effect on ovulation. It should be observed, however, that in particular cases the cause and the effect are not sharply divided, the atrophy and the habit being coincident, both evidences of a degeneration and of a neuropathic constitution.

In the third group Schenk includes the cases which have to do with *libido sexualis* and dyspareunia.

Pincus emphasizes the importance in a scientific study of sterility to examine both the male and the female. In 110 cases carefully investigated by Schenk, there were 65 (59.1 per cent.) in which the male was responsible. In 488 cases occurring in the private practice of Pincus, a careful examination was made of both the male and the female. In 119 cases (24.4 per cent.) the male was found to be at fault; 61 showed permanent aspermism, 37 showed permanent oligospermism, 14 permanent necrospermism, 7 were impotent. Besides this participation of the male, in 77 other cases (15.8 per cent.) sterility was caused by a direct transference from the male of a gonococcus infection.

The participation of the female was as follows:

There were 71 cases (14.5 per cent.) in which well-marked acquired lesions existed; thus, fibroids, 16; ovarian cysts, 2; retroposition and flexion, 19; inflammatory atrophic processes in the parametrium and the pelvic peritoneum not of gonococcus origin, 23; fungous endometritis, 11. There were 221 cases (45.3 per cent.) in which there were disturbances of development or malformation. This is the most frequent cause of sterility in the female. The anomalies of development were not entirely of fetal origin; some were acquired through constitutional diseases during early life, especially chlorosis and anemia. Intra-

[1] Archiv f. Gynäk., 1907, Band lxxxii, p. 188.

partum inflammatory affections producing conglutination was also a factor, as was coitus interruptus in young married women.

The developmental abnormalities were divided as follows:

Abnormally anterior situation of the vulva, near the symphysis, 8; abnormalities of the hymen, 6; abnormalities of the vagina, including a shortening of the anterior wall or an absence of the rugæ, mostly associated with an incapacity to retain the spermatic fluid, 35; faulty development of the uterus, fetal or infantile type, with movable, sometimes anteposed, sometimes retroposed or retroflexed body, stenosis of the cervix, etc., 34; congenital retroversioflexion, 23; hypoplastic anteflexed uterus, 29; uterus smaller than normal, or a slightly enlarged uterus having a lumpy form suggesting fibroids, 9; atrophy of the ovaries and their appendages, 17; general hypoplasia of the genital organs, chlorosis, anemia, etc., 28; high-grade onanism with atrophy of the ovaries, 19; vaginismus, 13.

From these tables it is shown that the male was directly responsible for sterility in 119 cases (24.4 per cent.) and indirectly responsible in 77 cases (15.8 per cent.), and that the female was responsible in 292 cases (59.8 per cent.), of which 221 cases (45.5 per cent.) were due to developmental faults.

Pincus advises the exercise of as much tact as possible in attributing the sterility to either the male or the female. He thinks that after the actual facts in the case are determined the man himself should make them known to his wife. Posner said that if actual sterility were determined, and all remedial measures were useless, it was the office of the physician to tell the full and unvarnished truth.

Pincus' opinions are not shared by all. Torkel[1] finds that in 26 per cent. of sterile marriages aspermism is responsible. When the female is at fault, an inflammatory process of some sort is found in the majority of cases. In two-thirds to four-fifths of all cases the woman is made sterile by her marriage. Only the smallest proportion of cases of sterility are attributable *a priori* to the female. Under such circumstances there is almost without exception malformation, imperfect development, or tumors.

According to Reynolds,[2] the causes of sterility may be conveniently classified for analysis, from a clinical standpoint, as follows: First, *those not easily remediable:* (a) Imperfect ovarian function; the ovaries fail to produce a perfect ovum capable of impregnation; (b) organic or functional imperfection of the tubes; the tubes are incapable of transmitting the ovum to the uterus. Second, *remediable causes:* (a) Inhospitable endometrium; (b) hostile secretions.

As far as ovarian imperfection is concerned, tentative proof of it in a

[1] Monatschr. f. Geburtsh. u. Gynäk., September, 1907, xxvi, 381.
[2] Amer. Jour. Med. Sci., August, 1907, cxxxiv, 209.

given case is possible only when the ovaries are exceedingly small, either from senility or from arrested development. Underdevelopment of the ovaries probably always implies underdevelopment of the uterus also, and the prognosis depends upon its degree.

Moderate enlargement of the ovaries is not necessarily a cause of sterility, even though it be bilateral. At the present time it may be said, that conservative operations on the ovary have not offered a sufficiently good prospect of cure to justify them in the treatment of small enlargements of the ovary, when there is no indication but sterility. The value of conservative ovarian surgery lies rather in the preservation of fertility than in the production of fertility.

When imperfect function of the ovary co-exists with perfect size, it cannot be diagnosticated. The existence of a merely functional incapacity has not been definitely demonstrated, but that it does occasionally occur is probable, and this perhaps explains some of the otherwise inexplicable cases of sterility in apparently normal women.

The effect on fertility of organic strictures and diseases of the mucous membrane of the tubes is very well recognized.

The endometrium may be inhospitable as the result of an infection or as the result of a chronic congestion without infection. The inhospitality of the endometrium must be detected clinically, as a rule, by observation of the uterine secretion. In almost all of the easily remediable cases the actual bar to conception is found in an alteration of the uterine or the vaginal secretion, or both, of such a nature as to be detrimental to the spermatozoa.

Reynolds[1] thinks that the treatment of sterility is too frequently based on an insufficient study of the patients. Before treating a woman for sterility, to any extent, the fertility of the husband should be determined. It is probably true that sterility is somewhat more common in women than in men.

Sterility in the female may depend on many possible lesions. The important factor, however, by which conception is prevented, in the vast majority of remediable cases, is an alteration of the secretion of some part of the genital tract of such a nature as to render it hostile to the ovum or to the spermatozoa. The most hopeful and the most essential part of the treatment of sterility is found in a study of the abnormal secretions and their restoration to the normal, both by removing the cause itself and by the direct treatment of the secreting surface.

The normal uterine secretion is a mildly alkaline albuminous fluid, of a very limpid consistency, somewhat scanty in quantity, insufficient for a perceptible flow from the os, clear, and so slightly viscid as to form a rounded drop without stringiness when withdrawn from the cervix.

The secretion of a congested endometrium is usually more profuse

[1] Loc. cit.

and more viscid than normal. The discharge from an infected endometrium varies from cloudy to purulent, and from a thin and watery to a semisolid consistency; it is usually alkaline, but it may be faintly acid. Constitutional conditions which lead to a general hyperacidity may make the reaction of the uterine secretion neutral, but an actual acidity.

The vaginal secretion is usually slightly acid; not markedly so in the normal condition, because if it were, it would injure or destroy the spermatozoon. It is necessary to the function of reproduction that the vaginal secretion should be so moderate both in quantity and acidity as to be easily displaced or neutralized by an alkaline semen.

The existence of a profuse and excessively acid vaginal secretion is one of the most frequent causes of sterility. From the standpoint of the study of fertility three states of the vaginal secretion must be recognized. First, the normal. A clear serous secretion, moderate in quantity, faintly acid in reaction, and containing varying quantities of white curdy material of very acid reaction. Second, a somewhat profuse discharge, not distinctly purulent, but turbid, yellow in color, of greatly increased acidity, and usually, though not always, free from the presence of the normal cheesy material. Third, an abundant creamy discharge, which may be purulent, seropurulent, or mucopurulent, and is usually, in addition, somewhat excessively acid in reaction.

In treating a case in reference to the secretions, litmus paper may be used to test the reaction both of the uterine and of the vaginal secretion. The cervix is exposed by means of a speculum and carefully cleansed by dry cotton. The appearance of the cervical secretion is then noted by compression of the cervical canal between the anterior blade of the speculum and a pledget of cotton pressed by forceps against the posterior aspect of the cervix. The drop of secretion so obtained may be tested with litmus paper, the latter being passed into the cervical canal if necessary, taking care not to excite bleeding. The examination of the vagina by means of a speculum should be made before any other form of examination and without the use of a lubricant in introducing the speculum.

In the treatment of hostile secretions, attention should be paid to constitutional overacidity. If an examination of the urine shows hyperacidity, the appropriate diet and hygiene should be selected and tested and modified by repeated quantitative analyses of the urine. It is not infrequently connected with an increased ingestion of salt, as evidenced by an excess of chlorides in the urine. An excessive quantity of secretion, due to congestion, may be relieved by glycerin suppositories. Acute or subacute or chronic infections which modify the secretions must be approprtaiely treated.

It is to be noted that Beyea,[1] relative to forcible dilatation of the

---

[1] Loc. cit.

cervix and the introduction of a Wylie drain, reports that of 15 married women, 5 have become pregnant since the operation. The previous history of the married women who became pregnant shows that 2 were married three years, 1 four, and the other 2 five years without any pregnancy. Since one-third of the married women became pregnant after operation, it is a fair conclusion that the treatment is a valuable cure for sterility.

GONORRHEA.

The Pathological Changes Which May be Produced by the Gonococcus have been reviewed by Anspach.[1] Besides the direct pus-producing action of the organism, he says, whether it remains localized on a mucous surface or is transported to distant joints or synovial sheaths, there is another factor in the symptom complex of a gonococcus infection. This factor is a toxin, called gonotoxin, which exists in the body of the diplococcus, and is not set free until the organism dies.

Wassermann made a culture of the gonococcus in nutrose serum and peptone bouillon, and, after sterilizing the culture, examined the fluid for a poison. He found that the death of the gonococcus made the body of the organism exquisitely poisonous. The smallest quantity of this poison produced inflammatory symptoms at the point of application, fever, swelling of the nearest lymph glands, and severe pain in the muscles and joints. Wassermann's research explained the muscular pain and the transient swelling of the joints sometimes observed during gonorrhea, even though the gonococcus is not found, by staining or by culture, in the blood or in the affected joints. It also explained the flaring up of inflammatory symptoms about collections of gonorrheal pus after all or most of the organisms have perished.

There is no immunity to gonorrhea in man, either naturally or by reason of a previous attack, and in chronic gonorrhea the individual is quite susceptible to a new superimposed gonococcus infection.

After an acute gonococcus infection in a woman has subsided, it may remain dormant in the tubules of Skene, Bartholin's glands, or the cervix. It may be aroused into new activity by finding fresh soil for invasion, or by a congestion of the tissues in its immediate vicinity. Rogers believes that this latency of the gonococcus is to be explained on the grounds that the mucous membranes primarily involved gradually become an unsuitable culture medium. That the gonococcus maintains its activity for a very long time is shown by Torrey, who found, after cultivating a certain strain of the gonococcus for over a year on ascetic media, that it was just as robust as when first isolated.

These peculiarities explain the clinical fact that an individual having

[1] Amer. Jour. Obst., April, 1907, vol. lv, No. 4, p. 467.

no symptoms of gonorrhea, but harboring the gonococcus in his person, may produce an active infection in another. The original infection, after developing new activity in the second individual, will cause a violent attack if returned to the first. The worst results of gonorrhea in adults are seen in pelvic abscess and in pyonephrosis. The tubes or ovaries may be bound together in such a mass as to be not only functionally worthless, but also the source of much suffering and misery to the unfortunate patient.

The mischief produced by the gonococcus is not confined to adults, and the lesions are not alone those which ensue from an extension of the infection along the mucous surfaces of the genital organs. The new-born infant and young children are great sufferers, and the gonococcus is capable, by metastasis, of causing trouble in almost any part of the body.

In children *gonorrheal vulvovaginitis* becomes a veritable scourge. Holt reported his experience at the Babies' Hospital in New York, where he found that, unless the most rigid quarantine was observed, gonorrheal vulvovaginitis would spread like wildfire through an entire ward or an entire hospital. Although in children vulvovaginitis is, as a rule, the sole lesion of genital gonorrhea, sometimes the disease extends into the uterus, and thence into the Fallopian tubes and pelvic peritoneum, as has been reported by Bidwell and Carpenter.

Kimball has described cases of what he calls gonorrheal pyemia. They occurred in children who had no sign of a local gonococcus infection, and were marked by the sudden development of pyarthrosis and serious septicemia. The gonococcus was found in the affected joints, and Kimball concluded that the organism had gained entrance through the alimentary tract. Six of the cases had terminated fatally at the time his paper was written, and the recovery of the two surviving was doubtful.

The frequency and the result of *gonorrheal ophthalmia* contracted at birth from the mother is shown in an analysis by Holloway of the cases at the Philadelphia Hospital in the last six and a half years. During this time there were 1076 children born there, and, in spite of prophylactic treatment in every case, 2.2 per cent. developed gonorrheal ophthalmia. Of 57 cases of ophthalmia neonatorum, involving 109 eyes, 25 of the eyes developed some corneal change, and 8 of them became blind, or had nothing but light perception. In 72 cases of young children and adults, comprising 106 eyes, admitted to the hospital, there were 58 eyes in which corneal changes developed; 8 of these had to be enucleated. In 21 there was absolute blindness, or light perception only. It is thus seen that where the cornea became involved it resulted in the loss of just 50 per cent. of the eyes affected.

When the gonococcus is swept into the lymph or the blood channels it may cause a wide variety of lesions. Lymphangitis and lymphade-

nitis are well known. A practical demonstration of the means by which the organism sometimes enters the circulation was afforded by Wertheim, who found the gonococcus in thrombotic capillaries underlying the mucosa of an infected bladder. The first observations concerning *gonorrheal endocarditis* were made by Thayer and Blummer in 1895. In 1897 Ahman made an exact recognition of the gonococcus in the free blood; he proved its identity, not only by culture and stain, but also by the experimental inoculation of the human urethra; he produced a typical attack of gonorrhea, which, curiously enough, was complicated by a tenosynovitis, from which the organism was recovered.

Thayer reported 2 cases of gonorrheal endocarditis in which the diplococcus was positively identified, and 4 cases in which the clinical diagnosis was plain; all of the cases were fatal. He says: "Such an experience as this is sufficient to emphasize the fact that an acute urethritis is by no means infrequently followed by an endocarditis, either of specific gonorrheal nature or due to secondary or to mixed infections which have found their port of entry in the urethra, or have settled later upon the primarily infected valves."

Thayer reported also, in the same paper, a case of *gonorrheal septicemia* in which were symptoms much like those of typhoid fever. He says this case demonstrates the fact that the mild, continued fever occasionally seen in connection with gonorrhea, without apparent complication, is, in some instances at least, evidence of a true gonorrheal septicemia, and that such a septicemia, existing in cases where there is no local indication of the disease, may run a course resembling typhoid fever.

Among the rarer lesions produced by the organism may be noted a case of *mastitis*, observed by Anspach at the University Hospital. Wertheim has demonstrated the organism in the ovary; Fritsch, Jullien, and Baer, in the connective tissue of the rectal mucosa; Mandl, in the subepithelial tissue of the vagina, in 3 cases; Madelener and Menge, in the muscle of the uterine wall; Maslovski, in the decidua and placenta of a nine-months' pregnancy; Kraus, in the deeper layers of the wall of the Fallopian tube; Hochmann, in a subcutaneous abscess of the left elbow; Horwitz, Bujwid, and others, in the pus from suppurative dermatitis; Schantz and Nolen, in gonorrheal exanthemata.

The number of deaths directly arising from gonococcus infections is unknown. According to Johnson, we can obtain an approximate idea of the *mortality of gonorrhea* from a consideration of the great number of major surgical operations performed on its account, the number of abortions which are caused by it, and the untold number of conceptions prevented by gonorrheal lesions. Although it cannot be positively ascertained, he believes that the number of lives lost or denied to the race on account of gonorrhea would equal the mortality of either pneumonia, tuberculosis, or typhoid fever, or, may be, all of them combined.

Gonococcus Infection during Pregnancy. Edgar[1] affirms that invasion of the uterine cavity by the gonococcus during pregnancy is less likely to occur than in the non-pregnant state. Gonorrheal infection during pregnancy is often apparently mild in character, and frequently fails to attract attention because there is no endometritis, tubal involvement, or pelvic inflammation.

For this reason the patient and her physician are apt to be deceived into a position of false security. Treatment is desultory or entirely neglected, and all too late during the puerperium the true seriousness of the infection is realized, being then clearly indicated by a gonorrheal ophthalmia in the infant and an extension of the infection to the uterus, tubes, and the pelvic peritoneum of the mother.

There is no antagonism, so far as Edgar's observations have gone, between the vaginal bacteria and the gonococcus. He thinks that the teaching of Bumm and Krönig must not be taken too seriously as applied to a gonococcus infection. Gonorrhea during pregnancy should be most actively combated, and before labor begins the vagina and external genitalia should be disinfected as thoroughly as possible.

Some of the Unusual Features of Gonococcus Infection in Women are described by Hunner.[2] Infection about the vulva may occasionally become serious in nulliparous women, by causing stenosis. An untreated infection, or a repeated infection, may cause a thickening from the formation of scar tissue. Well-marked stenosis of this character may sometimes require forcible dilatation under anesthesia, but most cases yield to a treatment of the chronic inflammatory affection together with the gradual dilatation of the stenosis.

A rare complication, following the infection of Bartholin's gland, is the rupture of the abscess into the bowel and the formation of a *recto-vaginal fistula*, involving the gland and the duct. Hunner has observed two such cases. In the first a prompt recovery followed drainage of the sinus, by laying it wide open from vagina to rectum. In the second, he attempted to conserve the sphincter, but there was unsatisfactory healing until, by a second operation, the sphincter was divided, and the fistulous tract allowed to heal from the bottom. In both cases the ultimate sphincter healing resulted in perfect function, the divided sphincter ends working up to the keystone of scar tissue.

Hunner further says that *stricture of the urethra* is a much more common sequel of gonococcus infection than is generally supposed. He not infrequently finds stricture as the only evidence of a past gonorrhea. The stricture may consist of a universal infiltration and narrowing of the urethral tube, or it may be annular and confined to one or several parts of the urethra. Strictures may be present without any further evidence of inflammation, the mucosa showing the normal color. The

---

[1] Medical Record, April 27, 1907, p. 687.
[2] Amer. Jour. Obst., vol. lv, No. 3, p. 337.

most frequent site of a stricture is the external urethral orifice, and a stenosis here is usually associated with an absence of the urethral labia, and is often the result of a gonorrheal vulvitis. In other parts of the urethra annular strictures occur at the internal orifice and elsewhere with about equal frequency.

In the *treatment of stricture* Hunner prefers repeated slight dilatation, aiming to restore the caliber without giving rise to fresh trauma. Strictures at the internal sphincter are the most painful and the most resistant to successful treatment. Although they may be present without inflammation of the mucosa, the most common picture is that of a co-existent granular urethritis, particularly of the lower two-thirds or half of the urethral tube; in other words, that part which bears the deeper Littre's glands. In treating such cases, the dilatation is followed by the application of mild caustics. In any case of granular urethritis the application of caustics is preceded by overdilatation of the urethral tube, in order to open the mouths of the urethral glands, thus favoring a deeper application of the caustic.

He notes the rarity with which *gonococcus infections of the kidney* are reported, but says that with a more common use of the renal catheter the disease will undoubtedly be recognized more frequently in the future. Cases of pyelitis or pyelonephritis, due primarily to the gonococcus, and in which this organism has been isolated, as the sole cause, are extremely rare. So far as Hunner knows, there is but one well authenticated case, namely, the one reported by Dodge. The case reported by Bransford Lewis and König, and one of Hunner's own cases, seem to be instances of a tuberculous kidney in which gonococcus infection occurred secondarily.

Although, as pointed out by Hunner, the gonococcus is rarely the organism, or the only one, isolated in suppurative diseases of the kidneys, it is indirectly the cause of many inflammatory kidney lesions. It acts in this way by causing partial obstruction of the lower urinary passages, thus predisposing the ureters and kidney pelvis to distention and infection.

Rupture of a Pyosalpinx. The actual rupture of a tube distended with pus into the abdominal cavity is a rare occurrence. From a study of the literature during the past twenty years, Mann[1] was able to find but 12 cases. To these he adds 3 cases which he operated upon, and a fourth case found at autopsy.

A pyosalpinx may be torn and its contents exuded without any involvement of the general peritoneum. Thus, a tube may rupture into a part of the peritoneal cavity which is shut off by adhesions, or it may rupture into some adherent viscus, as the bladder, intestines, or rectum. A rupture into the general peritoneum may set up a diffuse peritonitis, which much resembles that following rupture of the appendix, and causes death, unless operative means be employed. The condition is

[1] Amer. Jour. Obst., vol. lvi, No. 4, p. 461.

more amenable, however, to operative measures than peritonitis caused by appendicitis. He thinks that the number of reported cases of rupture into the free peritoneal cavity does not show the relative frequency of this accident. These cases are apt to be fatal unless operated on early, and often fatalities are not reported.

The cause of rupture is traumatism incident to childbirth, bimanual examination, or a blow. Rupture also may be spontaneous from ulceration or overdistention. Ulceration, he believes, is the more frequent.

The author draws attention to the necessity of bearing constantly in mind the possibility of rupturing a pyosalpinx, and to observe gentleness in the bimanual examination of such cases. He also emphasizes that operation must be prompt, and that the prognosis is much brighter in these cases than in those of ruptured appendix. Three of Mann's cases, operated on promptly, recovered. Of the 12 cases in the literature, 8 were operated on and recovered, 2 died after operation, and 2 were found postmortem.

Pelvic Inflammations. Watkins[1] believes that the non-operative treatment of pelvic infections is equally if not more valuable than the operative treatment. Infections are the most important of all pelvic diseases, on account of their frequency, morbidity, and mortality. The disease varies in cause, pathological anatomy, and treatment, depending upon whether it is puerperal or non-puerperal.

In non-puerperal cases the exciting organism is usually the gonococcus; in puerperal cases, other bacteria are commonly involved. On account of its nature, a re-infection is less likely in puerperal than in non-puerperal cases, and, as a consequence, complete spontaneous recoveries are more frequent in the former than in the latter.

In non-puerperal cases the infection almost invariably extends by a continuity of tissue (along the mucosa), and, consequently, salpingitis is more common than ovaritis; periovaritis is common, and parenchymatous ovaritis is infrequent. The disease involves chiefly the mucosa of the tube; broad ligament infections seldom take place, and embolic infections are almost never found. In puerperal cases the infection nearly always extends by way of the lymph and the bloodvessels, and, consequently, it more often affects the ovary than the tube. Parenchymatous ovaritis is common; periovaritis is relatively uncommon; the tubal wall is more often affected than the lumen of the tube; inflammatory exudates are frequently found in the broad ligaments; embolic infections are not uncommon.

The dangers of operative treatment are relatively greater in puerperal than in non-puerperal cases. This is largely due to the difference in the variety, the location, and the mode of extension of the infection, and to the presence of tissue which is undergoing involution.

The treatment of an acute pelvic infection that has extended beyond

[1] Surgery, Gynecology, Obstetrics, iv, 507.

the uterus includes rest in bed, an ice-bag over the lower abdomen, liquid diet of a high nutritive value, saline cathartics, enemas, and codeine as required.

Inflammatory exudates are at the present time known to be productive agencies against the extension of infection, and they possibly play an important part in the destruction of bacteria and the limitation of absorption of toxins. Formerly, the presence of pus was considered a positive indication for immediate operation. Now, it is known that pus after a short time becomes sterile and comparatively harmless in the absence of secondary infection, and that finally the bacteria and the toxins entirely disappear. In most cases such a change occurs in from one to two weeks.

From this it follows that operative treatment should not be adopted during the acute stage. Palliative measures should be used until the symptoms ameliorate and the condition becomes chronic. In a certain number of instances a secondary infection results, or there is a very evident abscess formation. Under these circumstances, incision and drainage may be required during the acute stage.

In the treatment of a chronic case, Watkins believes that the residuum of the infection, usually gonococcal, should be removed by incising and cauterizing Skene's tubules and the vulvovaginal glands. Superficial areas of infection should be treated with the nitrate of silver. Care should be taken, by suitably treating the husband, that no reinfection occurs. Constipation should be guarded against, while regular exercise, plenty of recreation, fresh air, and sunlight are essential.

In many cases the suffering is so pronounced there is no question that operation is advisable, and that medicinal treatment is useless. There are also borderline cases, where it is a question whether the symptoms are sufficient to indicate operation or not. In making a decision here one should remember that postoperative pain arising from adhesions and the regeneration of nerves frequently persist for weeks or months after an operation. Such pain, neurasthenic and hysterical patients are apt to attribute to the operation itself.

It is not Watkins' aim to condemn operations for chronic intraperitoneal exudates, but to contend that each case should be decided individually. Because a patient has had an attack of pelvic peritonitis, or because she may have some thickening about an ovary or a tube, is in itself no indication for operative treatment.

Coe[1] remarks that, under the influence of rest, hot douches, and boroglyceride or ichthyol tampons, the most extensive exudates may disappear, probably through lymphatic absorption, leaving the diseased tubes clearly outlined, where before they were indistinguishable, and that a symptomatic cure may be obtained unquestionably.

[1] Medical Record, April 27, 1907, p 684.

He does not believe, from his experience as a pathologist and a surgeon, that a tube once thoroughly diseased is ever restored to its previously normal condition. There is no doubt that the mucosa may be regenerated after exfoliation, but the ends of the tubes are nearly always agglutinated, so that sterility is inevitable.

Forssner[1] describes with more or less detail the treatment and its results of 1555 cases of pelvic inflammatory disease ·occurring in the clinic at Stockholm, under the supervision of Netzel, Salin, and Westermark.

Among these conservatively treated cases there were only 8 deaths, a mortality of 0.05 per cent. He gives the closer study of 456 cases, admitted between the years 1900 and 1905. Of these 456 patients, but 83 were exposed to operation. The expectant treatment was that commonly employed. Vaginal incision was only used when the collection of pus was easily reached by the vagina.

There were 373 cases treated conservatively. The duration of the treatment in about two-fifths of the cases was not more than thirty days; in about one-fifth, from thirty to forty days; in about one-fifth, from forty to sixty days; and in about one-fifth, more than sixty days. Usually the symptoms had entirely disappeared before the patient was discharged, but at the time of discharge not less than 235 (80 per cent.) out of 294 patients showed indurated areas in the pelvis. (In 79 cases the histories are faulty.)

To find out the subsequent history of these cases the author has adopted two plans. First, he has determined the number of patients who required subsequent treatment, and secondly, he has made a personal inquiry and examination of the cases as far as possible.. The first plan was relatively easy, because in Stockholm there are but two special gynecological clinics.

Between the years of 1900 and 1904, 314 patients were admitted who had had no previous attack. Of these, 28 (9 per cent.) were later admitted to his own or to the other clinic with a recurrence, and of these, 19 (6 per cent.), in a later attack, were operated on. He was able to locate, aside from those just mentioned, 66 patients, from whom he learned their subjective condition, and 40 of them he was able to examine. Forty-two (63.6 per cent.) had no pain at all, or very little; 17 (25.8 per cent.) were able to work, but had actual and annoying pain, and 7 (7.6 per cent.) were unable to work.

Of the 40 patients examined, 20 (50 per cent.) showed the pelvic organs entirely normal; 12 (30 per cent.) had alterations which might be described as scar formations or fixed malpositions, and 8 (20 per cent.) had indurated areas in the pelvis.

During approximately the same period of time in this clinic 83

[1] Archiv f. Gynäk., Band lxxxiii, Nr. 2, 1907, p. 447.

patients were operated on. There were 2 deaths (2.4 per cent.). To determine the late result of the operative cases, he has had communications from 55, and has examined 47; 47 (85.4 per cent.) are entirely well; 4 (7.3 per cent.) are able to work, but have annoying pain; and 4 (7.3 per cent.) have just as much pain as they had before. Of the 47 cases examined, 28 showed no pelvic disease, 12 showed scar tissue or fixation, 7 showed induration.

EARLY VAGINAL INCISION AS A CONSERVATIVE MEASURE IN PELVIC INFLAMMATORY CASES. Fraenkel[1] is an enthusiastic advocate of vaginal puncture for inflammatory lesions in the pelvis. He has devised a special instrument for this procedure, which is illustrated in his article, and which consists of a pair of round-pointed, dilating forceps combined with a trocar and cannula. The instrument is guided to the objective point between the first two fingers of the left hand. When the end of the instrument enters the collection of pus or serum, the trocar is withdrawn, and, in successful punctures, the fluid begins to flow out. If no fluid is obtained, the instrument can be directed to another point.

When the puncture has been successful, the forceps is withdrawn until the dilating blades engage the lower pole of sac. The handles are now pressed together with considerable force, stretching the opening so that it measures from 3 to 5 cm. in length and from ½ to 1 cm. in width. As a rule, there is no bleeding. The tissues are punctured and dilated or torn, but not cut. There is little danger of injuring the ureters or the uterine arteries. In case the puncture is made anterior to the cervix, there is some danger of injuring the bladder.

Injury of the bladder occurred in 1 case; in 1 case the peritoneal cavity was opened, neither of which accidents was of any detriment to the patient. In 3 cases there was considerable bleeding, but each time it was controlled by a firm tamponade of the vagina and the application of a heavy ice bag to the lower abdomen.

In all the other 85 cases the operation proceeded smoothly and without accident. Usually the entire process requires at most no more than one or two minutes, and can be done in a much shorter space of time than is taken to describe it.

In the after-treatment of these cases, after trying many forms of tubular drainage, he has finally adopted a hard rubber tube, somewhat tapering and fitted with a flange at its larger extremity. The perforations are of good size. These drains vary from 3 to 5 cm. in length and from 6 to 10 mm. in the widest diameter. Several of the drains are inserted into the posterior vaginal opening and fastened there with a suture. A little gauze is loosely placed in the vagina and the operative technique is completed.

Since using this form of drainage he has had absolutely no trouble

---

[1] Archiv f. Gynäk., Band lxxxiii, Nr. 1, p. 171.

with the retention of secretion in the opened sac. The tubes are removed one by one at intervals, the last one frequently remaining until the sixth week, the patient in the meantime going about and perhaps working.

As a rule, after this operation the temperature falls within from two to. four days. In cases where drainage has seemed to be incomplete, he has utilized the scheme of Bier and produced suction on the drainage tubes by means of an appropriate apparatus. The duration of treatment by this plan has averaged about forty days.

Of 71 patients in which he carried out the plan of operation described, 62 were cured without any other procedure. Of the remaining 9, 2 were cured by an abdomino-inguinal incision, 1 by means of abdominal, and 1 by means of vaginal radical operation. Four cases died, and of these he gives a full account to show that the fatalities were due to the condition of the patient and were not ascribable to the operative interference, nor to an insufficiency of the operative procedure.

Fraenkel states definitely what he means by saying that 62 cases were cured, and gives the length of time the cases have been under obsei vation. The greater number of the women today are so fully cured anatomically that nothing indicative of the former serious disease can be felt on palpation except the vaginal scar. Many of the patients pursue the hardest kind of work. At this time 3 are pregnant and under his observation; others have been easily delivered.

What are the indications for the operation? Fraenkel discusses this question in relation to four factors:

First. In what stage of the disease shall vaginal incision be performed, and after what length of observation of the case? Everyone knows, he says, that there are acute febrile inflammations of the small pelvis which subside of themselves very quickly. In such cases the incision is not necessary, but, as he has said, not harmful. If there were any positive indications that a given pelvic inflammation would subside spontaneously, it could be let alone well enough; but, according to his observation, there are no such indications. As a rule, he waits for eight days from the beginning of the disease, but he never permits a patient to lie for weeks awaiting spontaneous resorption or evacuation.

Second. To what sort of cases is this treatment technically applicable? From the author's experience he would say that any exudate or abscess which approaches to within an inch or more of the vaginal wall, or can be displaced to that position, is suited to this form of operation. It makes no difference whether the collection is large or small, high or low, hard or soft. The organ primarily affected is immaterial. Such a declaration could not be made in the case of vaginal incision after the usual technique. The instrument he describes has a special field in the evacuation of collections high up in the pelvis and projecting toward the vagina with a relatively small pole.

Third. In what forms of pelvic inflammatory disease is the vaginal incision indicated? He answers at once: In every form of febrile inflammation which produces a tumor. He specifically mentions acute suppurative parametritis, chronic parametritis, chronic phlegmonous parametritis, pyosalpinx, pyovarium, retention of pus in malformed uteri, suppurating hematocele, suppurating hematoma, and others. •

Fourth. What other methods of treatment are to be compared with the abdominal incision? Expectant treatment, abdominal (inguinal) incision, and radical operation. In the last year a considerable number of able observers have agreed to the greatest possible conservatism in the treatment of inflammatory infections of the genitalia. But it is to be emphasized that vaginal incision which removes nothing, and which is easy to carry out, and which has no disadvantages, and which not unusually makes a radical operation unnecessary, belongs to conservative treatment in the highest sense.

An abdomino-inguinal incision for the evacuation of pus, etc., is usually not to be compared with a vaginal one; it is far more dangerous so far as opening an uninfected part of the peritoneum is concerned, and it does not drain the abscess as well as a vaginal incision. In regard to radical operation, the enormous danger attending it in early cases is a sufficient contra-indication. When it becomes necessary to operate radically, however, after a vagnal incision, it will be found that the previous operation has added no difficulties. The author gives the full particulars of all of his cases.

THE TIME TO OPERATE IN CASES OF GONOCOCCUS PELVIC INFLAM-MATORY DISEASE is a subject taken up by Simpson.[1] He says that if operation is habitually undertaken shortly after an acute attack, many ovaries, tubes, and uteri will be needlessly sacrificed. In choosing the time for operation it has been Simpson's custom to absolutely decline to operate until four essential features were accomplished:

1. The patient's general health must be such that she has a good margin of reserve strength.

2. There must be no cellular exudate. If one exists, it is taken as an indication that the infection is still active. As long as the exudate exists there is danger from that infection; when the need of protection no longer exists, the exudate is absorbed.

3. The temperature must be absolutely normal, or lower, for at least three weeks. At first this was an arbitrary period, but in Simpson's experience it has proved to be the earliest uniformly safe time to operate.

4. When the preceding conditions have been demonstrated to exist, a bimanual examination is made and the temperature is taken every hour for four hours. If the traumatism of an examination causes a rise of temperature, it is certain that a greater injury due to an operation would very likely cause a serious inflammatory reaction.

[1] Loc. cit.

Delay is not practised, of course, in cases where pus is easily accessible for evacuation and in a few other types of cases in which sound surgical judgment may lead one to operate earlier.

Fecal fistula is much less likely to occur if an operation is done late, after the exudate in the intestinal wall has been absorbed, and these tissues are not infiltrated, soft, friable, and easily torn. By the strict observance of these principles it has been Simpson's good fortune not to have a single fecal fistula in his last series of more than 600 consecutive abdominal sections.

In a series of more than 230 consecutive abdominal sections done for the removal of the products of tubal infection, there have been only two deaths. In the entire series there was not a single serious intestinal complication of any kind following operation, and remarkably few were found at the time the operation was done.

Esch[1] notes that Henkel found that 80 (90 per cent.) of all cases of pelvic inflammatory disease recovered by the use of conservative treatment, consisting of rest, cathartics, hydrotherapy, glycerin tampons, hot air, etc. In consequence of this very favorable result, it is the practice in Olshausen's clinic to advise operation only when the therapeutic measures described do not give results. Operation is postponed when possible until the infection is nine months old, the temperature is normal, and any acute exacerbation of the suppurative process can be excluded.

In 142 cases exposed to laparotomy with these indications, Henkel reported a mortality of 4.2 per cent. Esch reports 83 abdominal operations performed during the two and one-half years from January 1, 1904, to June 31, 1906. There were 6 deaths, a mortality of 7.2 per cent. In all cases the free abdominal cavity was carefully packed off and the field of operation was cleaned by dry sponging. In only 2 cases was drainage employed. One patient died from accidental hemorrhage; another died from pulmonary embolsm; a third died from ileus on the fourth day, the patient at the time of operation being in a practically hopeless condition. Two cases died from purulent peritonitis. All of these deaths were in pus cases. Another death from ileus occurred in 20 of the cases not complicated by the presence of pus.

Boldt[2] agrees that the operative treatment of gonococcus pelvic infection depends upon the features of the indvidual case. If an abscess is present, bulging into the vaginal fornix, or if there is an accumulation of serous or seropurulent exudate causing the same physical condition, a large posterior vaginal incision should be made. The fingers should be introduced and all secondary collections incised at the most accessible part. The cavity is washed out as well as possbile under low pressure and loosely packed with gauze.

[1] Zeitschr. f. Geburtsh. u. Gynäk., Band lix, 1907, p. 1.

[2] Amer. Jour. Obst., vol. lv, No. 4, p. 449.

In the case of chronic infections, a vaginal operation should not be done if there is a possibility of saving some part of a tube or ovary. When a tube actually contains pus, no attempt should be made to save it; but if there is no suppurative infection, the organ may be conserved.

It is important to retain even the smallest part of the ovary if this appears possible. The existence of small cystic degeneration of the ovary is no contra-indication to the retention of the entire ovary or a part of it. The connection between the ovary and the ovarian ligament should always be preserved if possible. Even though the ovary is the seat of a small circumscribed abscess, a part of it may be saved. If neither ovary in whole or in part can be retained, a complete operation is advisable. If it is manifestly impossible to retain the entire ovary or a portion of it in its natural position, but a small part still seems fit for ovulation, the entire adnexa on both sides should be removed and the functionating part of the ovary should be excised at once and transplanted into the uterine cornu.

When a radical operation is done, it is desirable to remove the cervix, unless it is certain that the cervical mucosa is free of infection.

Prophylaxis of Venereal Disease. What can be done to lessen the ravages of gonorrhea? How many plans have been tried, and how many have failed! During the past year there has been great activity in societies formed for the suppression of the so-called social evils. Two noteworthy papers have appeared, one by Cleveland,[1] who says that education is the most important factor in the prophylaxis of venereal disease, and the other by Kelly.[2]

Kelly states that the protection of the innocent is the crux of the situation. If this can be accomplished, there will be no more transmission of venereal disease. The voluntary purity of one generation would forever break the link between past and future, and gonorrhea and syphilis would be abolished.

There are three ways of protecting the innocent: (a) Restrictive legislation operating upon the guilty. (b) Instruction of the innocent. (c) Education of the innocent.

(a) *Restrictive Legislation.* This is the most inefficient of all means of controlling any form of social evil, inasmuch as it depends for its success upon the hearty coöperation of the great majority of the community, the very body which constitutes the guilty party and renders the legislation necessary.

(b) *Instruction.* Next to legislation comes the question of instruction. Instruction *per se* is only capable of touching the fringe of the subject, and carries with it none of that vital, germinating, self-propagating

[1] Surgery, Gynecology, and Obstetrics, August, 1907, p. 145.
[2] Amer. Jour. Obstet., vol. lv, No. 4, p. 447.

principle which is an essential of every real propaganda in the socio-moral realm.

(c) *Education.* The true fountain-head of all moral reform is education, conducted at home, in the school, in the college, and in the Sunday school. All these agencies properly fulfilling their functions coöperate in building up the character of the innocent, so that when the temptation comes there is the power to resist, and passion is controlled and crime is stifled in its genesis.

Kelly draws a sharp line of distinction between education and instruction; education is that which truly educates, instruction is the mere imparting of information, or cramming the mind with facts. Education is a process of character formation to which instruction and athletics, and all the disciplinary activities of life, contribute their quota, so that the coming man may be thoroughly furnished for life's battles with nature against disease and against immorality of all kinds. The preeminent qualification of an educated man is that he loves righteousness and hates iniquity; if he lacks this mark he is still ignorant, and has been educated only in name.

The education of a child from youth to manhood depends on home training, plus school and college training, including the weekly Sunday school.

This education cannot be entrusted entirely to others, but must be guided by the parents. If 90 per cent. of the fathers and mothers of our land will care more for their children than they do for their pleasures or their gold, if they will be solicitous for the spiritual as well as for the temporal welfare of their natural heirs, this gigantic problem of education will be quickly solved. Take away this vantage ground, and all the other agencies you can bring to bear are as nothing.

"First of all, let us each one look to his own home life, and teach and train our own children aright. Then we can with better grace instruct and influence our neighbors. Let us see carefully what sort of teachers our children have, and insist that our educators must be men and women who, first of all, are chosen because of their own nobility of character.

"Then let wise instruction come in and play her part. Use carefully selected pamphlets relating to sex matters. Tell the boys about these things when they reach puberty. Let the mother deal wisely with her girls, guarding with jealous care the little ones, appealing to the reason of the older, and explaining as seems best, according to time and opportunity. Teach them to resent as an insult any approach toward masculine familiarity. Then see to it, at least, that the laws of our land are not corrupted by tolerating prostitution and bawdy houses under the specious term, 'a necessary evil.'

"Be wise in having recourse to legislation, and permit no laws which subject women to indignities and loss of personal liberty which do not

apply equally to men. You say that, after all, this will hardly accomplish a great deal. No; you can't reverse natural tendencies any more than you can check Niagara; but you can reach a great many individuals, you can relieve a vast amount of misery, and acquit yourself of your own individual responsibility, and I do not know that you can do more than this in any other relation of life."

TUBAL PREGNANCY.

The commonly accepted *treatment of tubal pregnancy at the time of rupture* has been immediate celiotomy. My own practice has been to follow this plan unless the patient were *in extremis*, and then to wait for reaction.

Robb and Simpson have discussed the question very ably, and I present their papers as worthy of careful perusal.

Robb[1] first draws attention to the fact that *tubal abortion* and not tubal rupture is the usual termination of extra-uterine pregnancy. Thus, Williams, in 1903, found that 78 per cent. of 289 cases ended by abortion, and only 22 per cent. by rupture. According to Martin, abortion is the general rule, and rupture occurs only when the abdominal end of the tube is occluded or the ovum bores directly through the tubal walls. The statistics of Runge, Schauta, Hirst, and Noble also show that tubal abortion is much more frequent than rupture.

The treatment of early cases of tubal pregnancy, in which a positive or a highly probable diagnosis of ectopic gestation can be made before rupture or any severe hemorrhage has occurred, should be immediate operation.

The treatment, however, of cases immediately following abortion or rupture, where the patient lies in a state of collapse, is a matter which is open to discussion. The question arises in a case of this sort whether the shock of operation, added to that already sustained from hemorrhage, is not more apt to induce a fatal result than if a waiting policy is adopted, and the operation is postponed until hemorrhage has ceased and the patient has begun to react.

Storer has expressed skepticism as to a woman's bleeding to death from a ruptured tube, saying that the hemorrhage will stop of itself when the patient is sufficiently exsanguinated. Robb believes that such a view is worthy of most careful consideration. It would be most difficult to show that, in cases operated on during collapse, a fatal result was not due to a renewal of the hemorrhage from the necessary manipulations of the structures involved and to the shock attending celiotomy.

The views expressed by others are cited. Noble believes that the proper course in such cases depends upon whether hemorrhage is con-

[1] American Journal of Obstetrics, vol. lvi, No. 1, p. 6.

tinuing or has ceased, and also upon whether the patient is so situated
that the operation can be performed immediately should evidences of
recurring hemorrhage become manifest.   Errors should be made upon
the side of prompt operation rather than that of undue waiting.   Von
Winckel operates in all cases of free hemorrhage into the peritoneal
cavity as soon as possible, and without regard to the condition of the
patient at the time.   He argues that, while with a weakening of the
heart's action in cases of severe hemorrhage the bleeding ceases, as
soon as the heart begins to work properly a recurrence of the bleeding
from the ruptured vessels sets in.   Bumm advises immediate operation
in cases of free hemorrhage; the worse the general condition the more
promptly must it be done.

Robb believes that when the gynecologist is called to see a patient
who is suffering from tubal rupture, the active bleeding has ceased in a
great majorty of instances.   An operation at this time may be sufficient
to cause her death, and there is a risk of producing a fresh hemorrhage
by manipulation of the tissues.   In the treatment of such cases he quotes
the views of Ahlfeld, who says:

"If rupture has occurred several hours before the patient is first seen,
and she has recovered somewhat from the initial shock, so that the pulse
can be plainly felt, it is a question whether it is not safer to keep the
woman quiet.   The blood poured out around the ruptured tube is
probably surrounding the point of rupture as a tamponing mantel.
Place ice bags or sand bags on the abdomen, support the patient's
strength, and, above all, give her bodily and mental quiet."

Interference at this time, Robb believes, will result in a certain number
of fatalities.   After opening the abdomen in such cases, a considerable
amount of blood is usually found, but an actual bleeding vessel is the
exception.   Spurting or oozing from the rupture is generally caused by
a sudden release of the blood that has been held under tension within the
encapsulating clot.

In cases of tubal abortion the hemorrhage is not often severe enough
to produce a fatal result.   Most of such cases, he believes, would un-
doubtedly recover without any further serious symptoms.   Of course,
the clinical differentiation between rupture and abortion is quite difficult.

For five years he has carried out the following treatment in cases of
ruptured tubal pregnancy.   If there are signs of improvement in the
patient's condition, and this usually occurs, operation should not be
done at once.   The patient is carefully stimulated by means of hypo-
dermoclysis, and in some instances also enteroclysis.   If there is no
vomiting and no nausea, stimulants are administered by mouth in small
quantities.   Morphine is given hypodermically for pain and nervous-
ness.   External heat is applied, and the lower end of the bed is slightly
elevated.   The sulphate of strychnine is given hypodermically in dose of
$\frac{1}{10}$ to $\frac{1}{20}$ of a grain every few hours, according to the indications.   While

this treatment is being carried out, the operating room is prepared, so that it may be used at a moment's notice.

This plan of treatment has also been adopted in cases seen for the first time at home. As soon as the patient recovers from the shock she is taken to a hospital, where an operation can be carried out at any time the necessity may arise. Every patient in his series has gradually improved, so that after two or three days' time, and in some instances after twelve days' time, the operative procedures have been carried out with very little, if any, shock to the patient. There was 1 death in the series of 20 cases. It occurred on the tenth day, from intestinal obstruction.

Robb is not prepared to state dogmatically that women do not bleed to death from hemorrhage following the rupture of a tubal pregnancy, but he is of the firm conviction that many desperate cases are lost from overhaste in operating. The idea that the abdomen must be opened as quickly as possible in order to check hemorrhage, which may or may not be going on, seems to have taken deep root in the minds of many gynecologists. If recovery follows the interference, "we saved our patient." If a fatal termination occurs, "the patient died from the previous loss of blood."

In asking what amount of hemorrhage is necessary to cause death, Robb notes that physiologists have estimated the total quantity of blood in the human body at about 7.7 per cent. of the body weight. Thus, a woman weighing 130 pounds would have 10 pounds of blood. Quoting from Howell, Robb says that the percentage of loss which can be borne by the human being has not been determined, but it is probable that the healthy individual may recover without serious difficulty from the loss of a quantity of blood amounting to as much as 3 per cent. of the body weight. This, in a woman weighing 130 pounds, would be a loss of 4 pounds, or 1650 c.c. It is questionable whether so large an amount, or, at any rate, much more than this, is found in the average patient of the above weight as the result of hemorrhage from a ruptured tube.

As throwing light on his contentions, the author reports experiments carried out on 13 female dogs. He draws attention to the fact that in the bitch the ovarian arteries are quite small, while the uterine arteries are vessels of considerable size, even as compared with the corresponding arteries in woman. The experiments were undertaken to show that rupture of the pelvic bloodvessels followed by peritoneal hemorrhage usually ceases spontaneously, and that the animal recovers if let alone.

In dog No. 2, the right broad ligament was cut through its entire extent, the uterine vessels being severed. There was active arterial hemorrhage, the blood welling up into the abdominal wound. The incision was quickly closed in layers. At the end of the operation the mucous membrane showed a distinct blanching, the pulse was 140, and small.

In dog No. 3, the left tube was cut through, the left ovary incised, and the left uterine vessels were cut.

In dog No. 4, the uterine vessels on both sides were cut across. There was free bleeding. The incision was quickly closed.

In dog No. 5, the same procedure was carried out as in No. 4.

In dog No. 6, a complete removal of the pelvic organs by one continuous cut from side to side was made. There was profuse bleeding. Closure of the wound was carried out.

In dog No. 7, 240 c.c. of blood was lost during the operation.

In dog No. 9, complete evisceration was done.

In dog No. 10, the uterine vessels were cut on both sides.

In dog No. 11, the uterine vessels were cut on both sides.

In dog No. 12, the right uterine vessels were cut.

In dog No. 13, which was pregnant, the bloodvessels in the broad ligament were very dilated, the uterine artery being 2 mm. in diameter at the juncture of the oviduct with the corpus uteri. The right uterine vessels were cut at this point and the bleeding was profuse. Immediate closure was carried out. All of the dogs recovered.

These experiments seem to indicate, Robb says, that an intra-abdominal hemorrhage, such as that met with in women having a ruptured tubal pregnancy, is not sufficient in itself to cause a fatal termination.

Simpson,[1] after referring to the advice commonly given to operate immediately, says that if this is followed, the patient will be exposed to operation under very unfavorable conditions. Certain death without operation should be the only consideration that would impel one to adopt such a course. It is Simpson's conviction that the actual facts do not warrant a conclusion that 70 or 60, or even 10, per cent. of those who sustain a rupture of a tubal pregnancy will of necessity bleed to death. If this view is correct, then an immediate operation should not be done unless every condition is favorable to a successful issue.

In approximately 100 cases of ectopic gestation, Simpson has yet to see a patient bleed to death at the time of rupture. He quotes Hartog, of the Landau's clinic, as having found in a complete review of German statistics, that not more than 5 per cent. of the victims of tubal pregnancy die from hemorrhage at the time of rupture.

A study of hemorrhage in general, as it relates to the lungs, the stomach, the intestines, and the uterus, shows that death rarely occurs from primary hemorrhage from any of these sources. By reason of their functional activity there is a predisposition to a recurrence of hemorrhage from a gastric, pulmonary, or intestinal lesion; whereas, in the case of a ruptured tube, no such cause need obtain if the patient is let alone.

The margin of reserve strength above the absolute needs of existence may be reduced to a very narrow limit by a severe hemorrhage. This

[1] Surgery, Gynecology, and Obstetrics, 1907, vol. v, p. 503.

margin may be wiped out entirely by a very slight additional source of depression, or it may gradually increase to normal if the patient simply hibernates for a time.

Many operators who advocate immediate operation have reported cases in which, after rupture, the patient's condition became desperate so quickly that death seemed inevitable and operation useless, and yet, to their surprise, the patient rallied, and operation was done some hours or days later.

From Simpson's experience he is led to believe that in the more serious types of hemorrhage it is particularly important to avoid adding even the slightest depression to that which already exists. He refers to the report of one of America's most able surgeons, who had about 100 cases of tubal pregnancy, and who stated that of those in which distal rupture occurred all but 6 per cent. recovered after immediate operation. When the rupture was at the proximal extremity, 42 per cent. of the cases ended fatally. This death rate, in proximal ruptures, is most gratifying if it is believed that all such cases would die without immediate operation.

In the proximal ruptures which Simpson has seen in his own and in Werder's experience not one patient died at the time of rupture or following a deferred operation. It is undoubted that recovery may take place after the sudden loss of a very considerable quantity of blood. Robson reports a case of hemorrhage from gastric ulcer, the patient losing 2 pints and yet recovering. Breck reported the loss of over 6 pints of blood within two and one-half days, with recovery. Edward Reynolds reports the loss of 2 quarts of blood from postpartum hemorrhage, with recovery. Coleman reports a typhoid fever patient losing 3 to 4 pints of blood in one hemorrhage, with recovery.

The essential features in regard to the treatment, according to Simpson, are as follows: A competent, quiet nurse of strong personality. *Absolute rest in one position, without a single voluntary movement. The entire avoidance of pelvic examination* is often desirable. In serious cases the diagnosis can usually be made from the history alone, and in such cases it is most unwise to run the risk of starting fresh bleeding by a vigorous examination. Unnecessary expenditure of energy should be controlled by the use of small doses of morphine. The temperature is to be maintained by external heat.

The volume of blood lost may readily be replaced by a small quantity of normal salt solution, given cautiously into a vein. It may be maintained by continuous enteroclysis, normal salt solution being used at the rate of 10 to 15 ounces an hour. The equilibrium of the circulation may be established by the use of strychnine, camphor, and digitalis in small doses, and by a proportionate dose of adrenalin chloride given with the intravenous injection or with the enteroclysis. Care and much good judgment must be used to avoid raising the blood pressure to such an

extent that fresh bleeding occurs, although Simpson is inclined to believe that this danger has been overestimated.

The indications for an immediate operation are definite, and the indications for a deferred operation with careful preliminary treatment are equally definite. In either case the object is to save life. If the patient's condition is not desperate at the time of rupture, operation may be done with safety. It then possesses the advantages of a brief convalescence and few adhesions. On the other hand, if the margin of reserve strength is reduced to a very low limit, operation will further depress the patient, and life may be lost.

Regarding immediate operation, it has been said, and truly, he thinks, that in the vast majority of instances hemorrhage has already ceased long before the abdomen is opened. This may readly be believed, for to operate within two hours of the time of rupture would be an unusual achievement. The prevention of recurrent bleeding, where hemorrhage has already ceased, can with safety be effected by practical hibernation, induced by morphine and absolute rest. This means of preventing a return of bleeding is far more simple and safe than an abdominal operation, with its added depression.

An operation designed for the removal of a ruptured tube and blood clots should not be done at a period when the margin of reserve strength is at the lowest point, but later, after the victim has regained sufficient energy to pass through the ordeal with comparatively little risk.

In the case of an immediate operation, the following combination of conditions is an absolute requisite for uniform success: A small amount of hemorrhage, which does not reduce the margin of reserve strength to a very narrow limit; a competent operator; skilled assistants and attendants; appropriate surroundings; adequate preparation.

On the other hand, any one of the following conditions will render deferred operation safer, and hence preferable. Profound depression due to serious hemorrhage, with or without other associated lesions; an unskilled operator; inadequate assistants, attendants, or facilities; hasty or inadequate preparation; the need of transferring the patient to a hospital, thereby seriously increasing the risk of continued or renewed bleeding.

MALPOSITIONS OF THE UTERUS.

Traumatic Displacement of the Uterus. Chase[1] emphasizes the fact that violence may displace the uterus, even though it is not pregnant. The accident is rather unusual. It frequently happens that in a given case it is practically certain that violence has caused a certain displacement, and yet actual proof is difficult, unless the previous pelvic condition had been ascertained.

[1] American Journal of Obstetrics, vol. lvi, No, 1, p. 59.

Violence may produce retroversion, prolapse, and procidentia, the first mentioned commonly, the last rarely. With retroversion, the uterus is frequently jammed into the hollow of the sacrum, so that a certain amount of force is required to replace it.

The *age* at which this accident has occurred varies from girlhood to senility. Richeraud reports a case of complete procidentia in a virgin aged fourteen, due to a violent effort during menstruation, and cases are found in which the patient was long past the menopause. Predisposing causes of the accident are said to be: a distended bladder or a tumor pressing the uterus backward, and causing intra-abdominal pressure to act on the anterior surface; a relaxation or an injury of the uterine supports, either the ligaments or the pelvic floor, from whatever cause, or an atony of the general abdominal and pelvic musculature; a top-heavy uterus, whether from simple congestion, menstruation, subinvolution, or tumor; diseased and consequently heavy appendages, tending to pull the uterus down, or adhesions and inflammatory products, causing slight backward or downward displacement.

The exciting cause is either a sudden violent muscular effort, or a fall in which the patient strikes on the back, the buttocks, or the feet. A tremendous increase of the intra-abdominal pressure produced by contraction of the abdominal muscles and fixation of the diaphragm while lifting, pushing, pulling, or slipping, is a competent cause.

At the time of the accident the patient often has the sensation as of something "giving way." Pain in the back is usually severe, especially on movement of the body. It not infrequently may be so intense that the patient faints. There is also a feeling of pressure or bearing down. Hemorrhage occasionally takes place, most commonly in the case of procidentia. Nausea and a peculiar indescribable sick feeling may be present. Painful and frequent micturition and extremely painful defecation are later symptoms if the treatment is not prompt. A tumor is present only in the rare cases of procidentia or extreme prolapse.

The prognosis in general is good. If the displacement can be reduced within a short time, the ligaments retain their elasticity, and the position is restored. If seen late the chance of a permanent reduction of the dislocation is more remote for the reason that the supports of the organ have lost their tone.

The treatment of early cases consists in an immediate replacement of the uterus to its normal position, and if necessary, holding it there while the damaged ligaments regain their tone. Tamponing for a day and rest in bed are safeguards. The knee-chest position will be advantageous. The use of an anesthetic may be wise. The avoidance of violent exercise for some time should be directed.

The subject has an important *medico-legal aspect*. Suits for damage are constantly arising in which the chief or the whole injury is an alleged uterine displacement due to violence. Chase's belief is that

14

bona fide cases do occur, but that many times a preëxisting displacement, possibly unknown to either the patient or the physician, is held to be a result of the accident. It may be extremely difficult or even impossible to determine the true state of affairs.

Operative Treatment of Retroposition of the Uterus. Olshausen[1] describes the operation which he has performed for eight or ten years in the treatment of retrodisplacement of the uterus. It was perfected by his former chief of clinic, Professor Koblanc. The operation is carried out as follows:

After making a median incision the anterior surface of the rectus fascia on each side of the incision is separated from the subcutaneous fat just above the symphysis. A silkworm-gut suture is then introduced through the fascia, about 2 cm. from the border of the incision, and carried through the belly wall into the peritoneal cavity. The suture then catches up the insertion of the round ligament a little from the muscle of the uterine horn, and is carried back again through the abdominal wall, 1 cm. distance from the point of introduction.

Before tying the knot, which will lie on the surface of the fascia, one takes care to see that the uterine angle is closely approximated to the belly wall. Three knots are put on the silkworm-gut suture and the ends are cut short. The same procedure is now carried out on the opposite side.

This is a slight departure from his original technique, in which Olshausen so introduced the suture that the knot lay within the abdominal cavity. The method has been used in hundreds of cases. When properly carried out, it is very sure to permanently cure the retroversion. If pregnancy occurs after the operation, the ascent of the uterus is never hindered. Olshausen has never seen an abortion from it. The report that he had a case of strangulation of the bowel as a result of this method is untrue.

Liepmann[2] describes a method of suspending the round ligaments very much like that of Olshausen's, except that the ligament is drawn through an incision in the peritoneum beneath the rectus muscle.

Rissmann[3] for the last five or six years has been performing an operation which differs more or less from that of Olshausen. He fixes the round ligaments to the belly wall at some distance from the uterus. After the knots are tied, the angles of the uterus are not in close contact with the abdominal wall, but there is a roomy space between the fundus and the peritoneum.

The round ligament is caught about 5 cm. from the uterus, and is attached by means of three fine silk threads to the peritoneum and muscle of the belly wall. If it is desired to secure even a more firm

---

[1] Centralbl. f. Gynäk., 1907, Nr. 41, p. 1225.

[2] Ibid., Nr. 6, p. 169.

[3] Ibid., Nr. 51, p. 1588.

fixation, the silk thread may include the fascia. After such a fixation, about 4 cm. of undisturbed round ligament connects the uterus with the abdominal wall. The author has never seen a recurrence, and the position of the uterus is physiological.

CORRECTION OF DISPLACEMENTS WITH REFERENCE TO PREGNANCY. Hurdon[1] reviews the principal operations which have been employed for the relief of displacements of the uterus, with reference to their influence upon subsequent pregnancy. She also reports in detail two cases of dystocia resulting from the operation.

Vaginal fixation was soon discarded by practically all surgeons, on account of the frequent occurrence of dystocia.

With the great increase in the number of cases of ventrofixation and ventrosuspension, instances of grave complications have become more and more frequent, so that at the present time the advisability of performing any intra-abdominal operation for the relief of retrodisplacement is often questioned, and the operation of ventrofixation is generally condemned.

The analytical reviews of the reported cases of dystocia following fixation operations published by Andrews and Seegert have shown that serious trouble occurs only when the uterus is fixed by broad, dense adhesions, and that when the uterus is merely suspended by slight adhesions to the parietal peritoneum subsequent pregnancy is practically normal. Holden found no serious disturbance in 83 pregnancies following 900 cases of *ventrosuspension* in Kelly's clinic, at Baltimore. Unfortunately, however, in some cases, from infection of the wound or from injury to the surface of the uterus by tenacula, needle-hole hemorrhages, etc., firm fixation has resulted where a simple suspension was intended.

One of the commonest causes of dystocia following *ventrofixation* is a high position of the cervix. During labor the cervix is usually drawn up still higher, and the force of the uterine contractions is directly toward the sacrum, instead of in the pelvic axis. Irregular expansion and doubling in of the anterior uterine wall occurs when the fundus is rigidly fixed and the normal upward expansion of the anterior wall is impeded. This may be accounted for by the upward displacement of the cervix, which allows a certain amount of downward and backward expansion of the anterior walls, while the posterior wall is displaced forward.

In a number of cases, however, the anterior wall forms a tumor-like mass, which encroaches upon the pelvic brim. This mass is usually described as a thick pad of muscular tissue, consisting of an excessively thickened anterior wall; but Hurdon is of the opinion that in all cases the anterior wall hypertrophies equally with the posterior; in order to

---

[1] American Journal Obstetrics, vol. lvi, No. 1, p. 24.

accommodate itself to the space between the fixation point and the cervix, it doubles upon itself, forming a sort of shelf or ridge.

Williams, Noble, and Hurdon have met this condition. Ill, in 3 cases of Cesarean section, performed on account of dystocia from ventro-fixation, found, upon liberating the adhesions before incising the uterus, that the uterus immediately resumed its normal position and shape.

Other complications have been met in labor subsequent to ventro-fixation. A transverse position of the fetus was noted in 15 to 21 cases collected by Lynch. Rupture of the uterus occurred in at least 5 cases. Postpartum hemorrhage was noted in only 3 of the cases of ventro-suspension collected by Andrews. Inertia uteri is relatively frequent, and is probably due to an excessive thinning of the posterior wall.

Because of the complications which have arisen during pregnancy and labor, as the direct result of fixation of the uterus, operations which aim to correct uterine displacement by shortening the round ligaments are coming more and more into favor.

Hurdon thinks that the operation of Gilliam seems at present to be the most generally useful. She, however, insists that it must stand the test of time, both in regard to its permanent adequacy and its freedom from later complications, before it can be unqualifiedly indorsed. She further says that, while no cases of dystocia following this operation have so far been reported, and while they are less likely to occur than in cases of direct fixation of the fundus, it is possible that, as sometimes happens with Olshausen's operation, infection of the attached proximal end of the round ligament may result in a rigid fixation of the cornu, and cause subsequent dystocia from asymmetrical expansion and partial torsion of the uterus.

In a recent discussion of this subject before the Philadelphia Obstetrical Society, the general opinion was that the instances of dystocia following suspension of the uterus had been very exceptional. The numerous intra-abdominal operations at present practised on the round ligament, after a sufficient time has elapsed, may be productive of far more trouble. Some of them are far more complicated than simple suspension, and to my mind far more capable of causing trouble, either immediately or some time after the operation.

Crossen,[1] after impartially discussing the various round ligament operations, submits a technique of his own, which I think has some advantages over others, especially, it would appear, in the rapidity with which the operation is performed. He advocates his plan when the round ligaments and adjacent tissues are freely movable and relaxed, and describes it as follows:

The special work for which the abdominal cavity was opened having been completed, the left round ligament is grasped with an ordinary

---

[1] Journal American Medical Association, May 4, 1907, vol. xlviii, No. 18.

tenaculum forceps about 1½ inches from the uterus. The right ligament is caught in a similar manner with another forceps, and the retractors are removed from the abdominal wall. Grasping the ligament of each side with the tenaculum forceps facilitates the subsequent manipulation of the ligaments.

The point of the puncturing tenaculum forceps is entered on the left side of the wound just beneath the upper sheath of the rectus muscle and about 1 inch above the pubic bone. It is passed outward beneath the sheath for an inch, and then the point is directed downward and made to puncture the rectus muscle and posterior sheath, but not the peritoneum. Guided by the fingers in the abdomen, it is then passed outward between the peritoneum and the aponeurosis to a point about 1 inch from the internal inguinal ring, where it is made to penetrate the peritoneum. The handle of the instrument is then raised so as to direct the point toward the round ligament, and is made to grasp the ligament and peritoneum 1½ inches from the uterus.

In the cases to which this plan is applicable the ligament is usually so stretched and lax that it is easily drawn into the new canal as a small cord. If the round ligament is unusually thick, or if the surface peritoneum is so thickened that it probably will not pass easily into the forceps canal, it may be snipped open and the ligament alone may be grasped and brought into the canal. The forceps is then withdrawn, pulling the ligament along the forceps track and out at the abdominal wound. The loop of ligament brought out is caught and held by an ordinary tenaculum forceps, while the right ligament is drawn out in a similar manner.

After the ligaments are brought into position the tension is adjusted. It may be necessary to pull out a little more of the proximal part or a little more of the distal part, the former to hold the fundus well forward and the latter to close effectually any space that may exist between the distal part and the parietal peritoneum.

By paying attention to this point the peritoneal puncture may be made at a considerable distance from the internal inguinal ring without leaving any opening through which an intestinal coil might slip. If especially fearful of such an accident, the forceps may be carried to within a half inch of the ring, or even practically to the ring, before puncturing. The peritoneum, being freely movable on account of the loose subperitoneal tissue, is drawn inward and puckered when the proximal part of the ligament is pulled on to bring the uterus forward. The peritoneal exit is thus brought near to the aponeurotic exit of the new ligament, at the outer margin of the rectus muscle. The direction of the new ligament, therefore, is forward, practically the same as in the Gilliam-Ferguson operation by the regular technique.

The ligaments are fastened in their new position, the loops being overlapped if they are of sufficient length in the median line, and fastened to ·

each other and to the upper sheath of the rectus. If the loops are not long enough to reach to the median line, they are fastened securely in the forceps track by catgut sutures passed through the overlying sheath of the rectus muscle. The abdominal incision is closed in the usual way.

Results of Operation for Prolapse of the Uterus. Scharpenack[1] gives the results of 100 Wertheim-Schauta operations for prolapse of the vagina and uterus. The technique of the operation corresponds closely to that which I described in PROGRESSIVE MEDICINE of last year as used by Watkins.

A transverse incision is made between the cervix and the anterior vaginal wall, the bladder is pushed up, and the vesico-uterine pouch is entered. The anterior vaginal wall is divided sagittally as far as the urethra, and lateral flaps are separated from the bladder from 2 to 3 cm. in breadth. After careful hemostasis, the uterus is drawn through the opening by means of a double tenaculum.

The tubes are ligated in the manner which will be described later, and the uterus is fixed beneath the base of the bladder and between the vaginal flaps. The lower end of the sagittal incision and the transverse incision remain open in case the latter has been made with the cautery knife. They are drained with a strip of gauze. The only advantage in making the transverse incision with a cautery knife is a reduction in the amount of hemorrhage; its disadvantage lies in the prevention of primary union. In a number of cases a transverse incision was not made at all, the uterus being pulled beneath the bladder through a sagittal incision and the entire vaginal incision being closed over the uterus.

Sometimes, when there are adhesions between the top of the bladder and the anterior wall of the uterus, the location of the vesico-uterine fold is quite difficult. In these cases the author dissects against the uterus up to the fundus without opening the peritoneum. A finger is introduced into the rectum and the fundus is strongly pressed forward, so that one can easily and certainly determine that nothing more lies above the upper confines of the dissection but the plica; this can then be opened without any danger.

The entire operation, inclusive of closure of the tube and a perineor-rhaphy, can be done in thirty-five minutes. The tube is tied in two places and divided with the Paquelin cautery. The redundant vaginal mucosa is resected. If trachelorrhaphy or an amputation of the cervix is desired, it should be done as a preliminary step.

In the entire series of 100 patients there was not one death. There are but few complications in the performance of the operation. The difficulty in opening the vesico-uterine space is entirely dependent upon the experience of the operator. In 2 cases the bladder was injured, but the injuries were easily repaired and the convalescence was uneventful. In

---

[1] Centralbl. f. Gynäk., 1907, Nr. 36, p. 1073.

one case, upon delivering the uterus, there was a sudden outpouring of pus. It was not known whether this came from a small pelvic abscess or from an overlooked pyometra. The operation was continued, but strips of gauze were placed on both sides of the uterus, and the plastic operation on the peritoneum was postponed.

In 2 cases ascitic fluid was evacuated. In 2 cases at the same time with the prolapse operation subserous myomas were enucleated. Convalescence averaged seventeen to nineteen days in duration; 75 per cent. of the patients left the clinic at the latest by the nineteenth day, and more than half on the sixteenth day.

In regard to the cures obtained by the operation, only 69 cases, for various reasons, are available to determine the ultimate result. From 24 of these there are only brief communications, but the others have been examined. Of the 69 cases there were 4 under thirty years of age, of which 2 were not benefited. There were 30 between thirty-one and forty-five years, and 29 patients between forty-six and sixty years, 4 poor results occurred in each of these series. There were 6 patients over sixty years old, and of these, but one, the eldest, complains.

Out of the 45 cases examined there were 5 recurrences. By recurrences the author does not mean a total eversion of the vagina or of the largest part of it, but a protrusion of the anterior wall resembling a small cystocele. Twenty-one cases were absolutely faultless. Very slight anterior descensus upon bearing down was recognized in 16, and slight posterior descensus in 3. With the exception of 2 women, whose pain, however, is mostly of a nervous nature, and does not last, all the women are pleased with the result.

The author believes, on the grounds of his investigations, that with this Wertheim-Schauta operation one may expect almost 100 per cent. of permanent cures. He makes two recommendations to insure its success: First, make sure of supporting the cystocele by fastening the fundus close to the urethra. Second, supplement the cystocele operation by an extensive posterior colporrhaphy.

Keefe[1] reports the end results in a series of 48 cases of operation for prolapsus. Forty-six were treated by a plastic operation, combined with Alexander's operation. Two cases were treated by plastic work only, although 1 of them was subsequently operated on by the Alexander method.

Twenty-three (47 per cent.) out of the total number have been traced. Of the 23 cases examined, 18, or 77 per cent., are cured of their previous symptoms, and the uterus is in good position. Of the remaining 5 cases, 2 have had a return of prolapsus to the second degree, but without any subjective symptoms. In 1 case the prolapse returned after the birth of a child. There were 2 other cases of failure.

---

[1] American Journal of Obstetrics, vol. lvi, p. 616.

GYNECOLOGICAL OPERATIONS.

It is a matter of surprise to note the views of Morris[1] in reference to the importance of *rapid operating.* He believes that the surgeon of today spends too much time in an unnecessary detail of surgical technique. He quotes the opinion of an expert anesthetist, whom he asked what he thought was the most common fault among surgeons. The answer was, "Puttering and unnecessary attention to detail in technique." Morris fully agrees with the ancient and the modern writers who argue against haste in operating. He says that we must cultivate, nevertheless, so far as possible, a rapidity of action which will make every second count, and which will allow an abdominal operation, for instance, to be completed in about fifteen minutes.

I do not agree with Morris. While it is a mistake to adopt a complicated technique, and to try every new operative innovation and variation, I believe it is most important to spend much attention to detail. A patient is no worse off, as a rule, for the extra amount of anesthesia necessary if one makes it a point to cover all raw surfaces, examine the surrounding organs, and secure a careful and accurate closure. In a very simple case this might all be done in fifteen minutes, but certainly not in a pelvic operation of any moment.

The suggestion of Chase,[2] who advocates the completion of every preparation possible before the administration of the anesthetic, is a very sound one, except in the case of very timid or nervous patients, when it may be omitted.

A small matter, apparently, but one deserving of mention, is the recommendation of Gordon,[3] who advises introduction of the needle from within outward when inserting through-and-through sutures. This is done in order to avoid the carrying of infection to the deep tissues.

Watkins[4] draws attention to the value of blunt dissection in plastic work upon the perineum. There are several advantages in blunt dissection by means of scissors over the method of denuding in strips. Very much time is saved, there is less hemorrhage, and the raw surface which results gives a very firm union, the muscular and connective tissues being better exposed than by denudation. The dissection is made in plastic operations by thrusting the scissors beneath the mucosa of the vaginal walls, separating the blades as far as necessary to expose the underlying tissue. The separated vaginal mucosa may then be excised to the desired extent by a direct incision on each side.

Vander Veer[5] emphasizes the importance of preserving the vault of

[1] American Journal of Obstetrics, vol. lvi, No. 5, p. 561.
[2] Ibid., No. 4, p. 456.
[3] Ibid., No. 1, p. 74.
[4] Surgery, Gynecology, and Obstetrics, vol. iv, p. 507.
[5] American Journal of Obstetrics, vol. lv, No. 1, 1907.

the vagina in pelvic operations. When this is not done, the vault becomes contracted, flattened, and shortened, dragging the vaginal walls and implicating the nerve trunks, leaving the patient with a constantly increasing irritation and a neuritis that is not easily overcome.

In speaking of the *abdominal incision*, Noble[1] says that when aseptic conditions are being dealt with, it should not be longer than is necessary to operate comfortably. In the presence of septic conditions, on the contrary, an abundance of room is necessary for the isolation of the septic focus. Where pus is likely to be found it is better to make a direct, simple incision, rather than a gridiron one, because septic fluids are much better controlled through a simple incision, which can be lengthened as desired.

Anterior Vaginal Celiotomy. Bandler[2] describes the technique, and gives the indications for anterior vaginal celiotomy. The important element, he says, in a successful vaginal celiotomy is a longitudinal incision, with a thorough separation of the bladder, especially of its lower lateral attachment to the cervix.

A further aid to a successful performance of this operation is the use of specula of proper lengths and widths, by means of which the cervix may be pulled far down toward the vulva outlet or pushed backward, in order to bring the fundus forward. With these specula also the bladder is held up out of the way, permitting work upon the vesico-uterine fold of the peritoneum; and even a large uterus may be drawn out of the peritoneal cavity with ease. The exposure of non-adherent tubes and ovaries is made a relatively simple procedure. The technique of the operation is described as follows:

A short posterior speculum is introduced and firmly pressed against the posterior vaginal wall and the perineum. The cervix is then firmly grasped by two volsella, which should be passed through both the anterior and the posterior lips. By firm, steady traction the cervix is brought as close to the posterior wall of the vulvar outlet as possible. A wide transverse incision is then made with a pair of scissors just below the margin of the bladder, the incision passing well through the mucosa of the vagina down to the wall of the cervix.

Two artery forceps are applied to the upper margin of the incision on either side of the median line. A slight cut is made in the vaginal mucosa between the two artery forceps with a pair of long, sharp-pointed scissors. The lower blade is pushed between the vagina and the attached bladder, and by a series of short cuts the vaginal wall is incised for a distance of from two to four and one-half inches, an anterior speculum being introduced to make tension on the anterior vaginal wall.

The flaps of anterior vaginal wall thus defined are carefully separated from the bladder throughout the whole length of the longitudinal incision

[1] American Journal of Obstetrics, vol. lvi, No. 3, p. 328.

[2] Ibid., vol. lv, No. 1, p. 34.

by means of blunt dissection. This separation should be carried as far out as the lateral margins of the cervix along the lower transverse incision. Higher up it need not be carried quite so far laterally, but it should be continued upward for at least a half inch above the end of the longitudinal incision.

The artery forceps attached to the vaginal flaps are removed, and the lower edge of the bladder is separated by the finger from the anterior wall of the cervix until the vesico-uterine fold of the peritoneum is reached. The posterior wall of the bladder should be separated by blunt dissection from the peritoneum of the anterior fold of the vesico-uterine pouch, for a distance of at least two to three inches above the base of the vesico-uterine *cul-de-sac*. This separation can be subsequently increased if desired.

A wide speculum of medium length is introduced and the bladder is lifted up, exposing the point at which the peritoneum of the anterior and the posterior walls of the vesico-uterine *cul-de-sac* unite. The peritoneum is grasped in the median line with two forceps, and an incision is made between them with scissors, opening the peritoneal cavity. The incision is extended upward as far as the bladder peritoneum has been loosened, artery forceps being put on at successive stages to bring the peritoneum clearly into the field. If desired, the bladder may be still further separated and the longitudinal incision increased. An additional transverse incision may be made through the base of the vesico-uterine fold of the peritoneum.

In nulliparæ, after separating the bladder from the cervix, a thick membrane is sometimes encountered which has to be perforated or cut before the vesico-uterine fold is reached. If the operator is in doubt concerning the identity of this structure, the introduction of a vesical sound distinguishes it from the bladder.

A wide speculum, of fair length, is introduced into the vesico-uterine pouch, the short posterior retractor is removed, and a long posterior retractor is substituted. The latter serves to push the cervix back and to bring the fundus forward, the volsella being taken off. The same advantage may be obtained by pushing back and holding firmly the volsella attached to the cervix.

The anterior uterine wall is carefully grasped at the highest accessible point with a double tenaculum. Gentle traction serves to pull the uterus more clearly into view, when volsella may be applied at a higher point, and so on, until by gentle traction, movement from side to side, and a slight rotary movement, the fundus is pulled into the vagina along the under surface of the wide speculum. Sometimes it is necessary to twist the uterus around so that one horn lies anteriorly in the middle line. This brings the adnexa more readily into the field of operation. Such a manipulation is not easy in nulliparæ. It is sometimes of advantage to use lateral retractors.

When the uterus has been drawn into the vagina there is considerable room between it and the anterior speculum, provided the longitudinal incision of the anterior vaginal wall and the incision of the vesico-uterine fold are long ones and the speculum is wide. The fingers can be introduced through this space; through it the tubes and the ovaries may be palpated and brought into view; adhesions may be loosened and small tumors extirpated.

It is frequently necessary to use sponges on holders in order to keep the intestine and the omentum out of the way. This is facilitated by a slight elevation of the lower end of the operating table.

If the tubes and the ovaries are not readily drawn into view, Cleveland forceps may be applied at successive points along the tube. Sometimes it is necessary to put a ligature about the tube at the uterine end, and in this way gradually pull it out. Sometimes it is necessary to put on clamps in succession. If adhesions are present, they must first be loosened by the fingers. With the tubes and the ovaries thus freely exposed, any operation, even a conservative one, is a matter of ease.

Adhesions may make the removal of adnexa through the vagina most difficult. It is often necessary to take out all of the retractors and introduce two fingers. With this manipulation it is often of great advantage to use the external hand, as in a bimanual examination, for the purpose of breaking up the adhesions. Care is necessary not to tear the broad ligament or the mesosalpinx or the infundibulo pelvic ligament, all of which are frequently thickened, brittle, and retracted. If torn, they retract and bleed.

Bandler discusses the pros and cons of *vaginal celiotomy*, giving the views of experienced surgeons and their operative results. It is evident that the vaginal demands greater skill and experience than the abdominal operation. It also has more limitations. The following are given as indications for vaginal celiotomy:

Vaginal celiotomy may be used as a matter of choice for movable retroflexion or retroversion of the uterus without marked descent, when the operation to be performed is either vaginal shortening of the round ligaments, vaginal fixation of the round ligaments, or fixation of the round ligaments to the anterior wall of the uterus. An Alexander-Adams operation, however, meets all the indications, unless one is dealing with pathological ovaries, tubal disease, peritoneal adhesions, or some other pathological intraperitoneal involvement. When there is a complicating disease of the appendix, or if the retroflexion, retroversion, or retrodisplacement is due to a parametritis which involves the utero-sacral ligaments, or if there is a congenital retroflexion with a long uterus and a short anterior vaginal wall, an abdominal operation is advisable.

Vaginal celiotomy may be used in the operative correction of descent

of the uterus, if the organ is large and heavy, especially if the patient is very fat or the abdominal walls are very lax, and vaginal suspension or fixation is preferred. It may be indicated also for the correction of cystocele, with or without uterine displacement, when a vaginal suspension or a vaginal fixation is required.

Vaginal celiotomy is applicable to many operations for the cure of prolapse when the uterus is large and heavy. A high amputation of the cervix and a high perineorrhaphy are an essential addition to a thorough vaginal fixation. Exploratory vaginal celiotomy may be used for doubtful pelvic conditions, as to determine the cause of sterility, or in cases of suspected ectopic gestation.

Vaginal celiotomy may be combined with conservative or minor operations on the adnexa, when there are slight or cobweb adhesions, especially if at the same time retroflexion or retroversion, plus descensus or cystocele, furnish an indication for vaginal suspension or fixation. It affords a convenient avenue of approach for the production of artificial sterility, by resection of a part of the tubes; for the removal of small movable tumors of the ovary or tubes; for the removal of small, suitably placed fibroids of the uterus.

Vaginal celiotomy may also be a preliminary to: (*a*) Hysterectomy for uterine diseases, if the uterus is not too large, and if it is not essential, as in carcinoma of the cervix, to remove an unusually wide area of the broad ligaments, etc., and if there is no danger, as in certain cases of myoma, of opening a degenerating tumor; (*b*) hysterectomy in cases of double pyosalpinx.

The choice of the vaginal operation is debatable, first, in certain cases of ectopic gestation when there is neither tubal abortion nor tubal rupture, no actual active hemorrhage, and no hematocele. It is also questionable in moderate-sized movable cystic tumors.

Vaginal celiotomy is contra-indicated during preganancy or shortly after labor or abortion. If vaginal celiotomy has been previously done, or if the appendix or other intra-abdominal organs are to be explored, the operation is unsuitable. When the vagina is narrow and the perineum is rigid, or when for any reason the cervix cannot be pulled down easily into the vagina, the difficulties in the performance of vaginal celiotomy form contra-indications to its employment. In the case of unilateral pyosalpinx or salpingitis the operation is apt to cause an extension of infection on account of the manipulations required for its performance.

The operation should not be chosen for the removal of an ovarian cyst with a twisted pedicle, or for large tumors of the ovary, cystic or solid. An abdominal operation is preferable in the case of a large fibroid tumor of the uterus when the growths are of any size, and when they have an intraligamentous development. The same is true in most cases of tubal pregnancy.

Conservative Surgery of the Pelvis. Robb[1] makes an analysis of 419 instances of conservative operations on the tubes and ovaries. From his experience in this line of work, for more than seven years, he is convinced that there are great advantages to be obtained by preserving, so far as possible, the integrity of the pelvic organs. It is true in a small percentage of cases (2 to 5 per cent.) that a secondary operation will be required to completely relieve the symptoms, and it is possible that a conservative procedure may even make the patient worse; such experiences are exceptional.

Nevertheless, before employing the more conservative procedures, one should make it a rule to carefully explain to the patient or to her friends the possibilities mentioned, and to state that such measures will be undertaken if, in the surgeon's judgment, at the time of the operation they seem to be advisable. After a clear statement has been made to the patient, she is, as a rule, willing to take a good many chances if there is a reasonable prospect that conservatism will be compatible with future health and comfort.

If an ovary or even a portion of an ovary can be saved before or even during the menopause, not only the immediate convalescence, but also the subsequent condition of the patient, is in every way more satisfactory. The discomfort sometimes experienced from an artificial change of life makes important conservation of ovarian tissue whenever this is possible.

The question of pregnancy after a conservative operation is of secondary importance, for in the majority of cases the patient is in an unhealthy condition, not only for bringing children into the world, but also for the proper rearing of them.

It is wise to remove the Fallopian tube whenever there are evidences of pus. The same radical treatment is not always indicated in the case of the ovary, for even an abscess sometimes does not involve all of the ovarian stroma. Microscopic examination often shows that the pus is walled off, and that the ovarian stroma beneath has been invaded to only a slight extent. In such instances the abscess may be excised and the line of incision may be brought together with a fine silk or catgut suture.

As indicative of the extent to which he employs conservative measures, the author notes that in 97 pus cases, 104 ovaries and 16 tubes were saved, and that in 419 other cases, 572 ovaries and 214 tubes were saved.

The mortality in the 97 pus cases was 3.04 per cent., and in the 419 other cases, 7, or 1.67 per cent.

Operations for Cystocele. Noble,[2] who uses a modification of the original Sänger lateral-flap operation for cystocele, draws down the cervix with a tenaculum, and attaches another one to the anterior vaginal wall near the internal orifice of the urethra. Traction on these

---

[1] American Journal of Obstetrics, vol. lv, No. 2, p. 190.

[2] Journal American Medical Association, December 14, 1907, vol. xlix, No, 24.

two forceps puts the anterior vaginal wall on the stretch. The vaginal wall is incised with scissors along the median line between these two points, laying bare the bladder.

The sides of the vaginal opening are then seized with artery forceps, and either with the finger or gauze they are dissected from the base of the bladder; the latter is also separated from the cervix and the anterior face of the uterus as high as the internal os or the peritoneal reflection. The bladder is detached from the vagina laterally until it is sufficiently free to be pushed up into the peritoneal cavity. The redundant lateral flaps of the vagina are then excised. As a rule, the excised portion is oval in shape, the broader end of the oval being toward the cervix. Care should be taken not to excise too much, as the tendency is to overdo the excision.

The operation is completed by two rows of half-stitch continuous sutures, the first row buried and embracing the deeper layers of the vagina and catching up some of the bladder tissue for the first inch of the incision, and then suturing the deeper layers of the vagina to the anterior face of the cervix. This is followed by a superficial row, with a single tie at the anterior end of the incision. It is well to place two or more mattress sutures of chromicized catgut to take the strain off the continuous suture. Interrupted sutures may be used entirely, in which case the first suture should be inserted at the cervical end of the wound, and each suture should include uterine tissue until a point is reached at or above the internal os, so as to insure the re-attachment of the vagina to the anterior face of the uterus and the permanent elevation of the bladder.

Edward Reynolds[1] describes his method of performing an operation for cystocele as follows:

He exposes the anterior vaginal wall by means of a Sims' speculum, and selects six points, as indicated in the accompanying sketch.

The points AA' lie upon the lateral vaginal wall, as close as possible to the cervix uteri. The points BB' lie directly lateral to AA', or very slightly anterior to them, and upon their correct selection depends the whole success of the operation. It must be remembered that, although in the illustration the points BB' necessarily appear lateral to AA', they are in reality a short way down the lateral wall of the vagina when in its natural position. These points BB' should be selected by the following method:

A point which appears to the eye to be at about the proper position is seized with a tenaculum and drawn to the median line immediately in front of the cervix, which is, perhaps, pushed a little backward into the sacrum by the maneuver. If the points selected cannot be drawn together in the median line without undue tension, they should be placed a little

---

[1] Boston Medical and Surgical Journal, June 13, 1907, vol. clvi, No. 24, p. 774.

further from points AA'.   If they can be carried beyond the median line, they should be selected a little nearer to AA'.
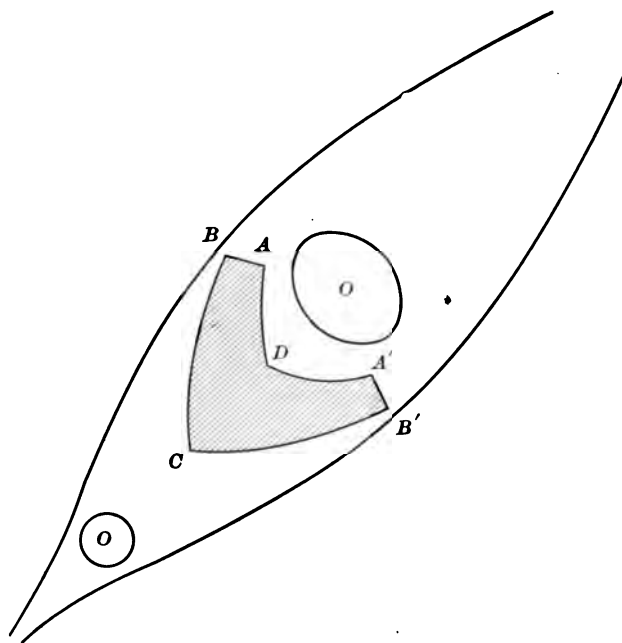
FIG. 53
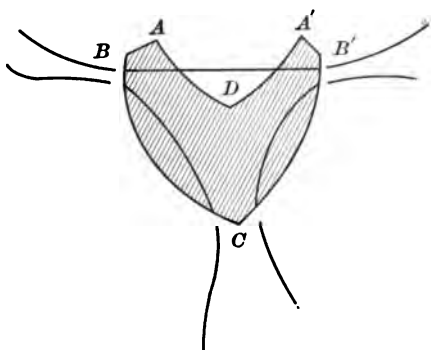
FIG. 54
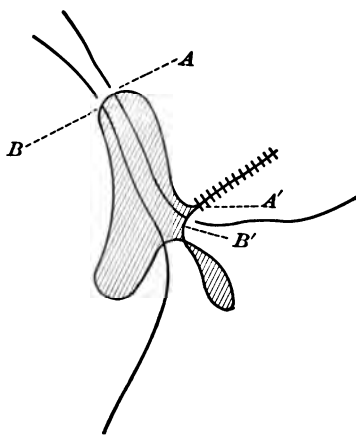
FIG. 55

Reynolds' method of operating for cystocele.

The exact selection of the points BB' is of extreme importance.   If they are too far from the points AA', the resulting union will be too low upon the anterior vaginal wall to be effective in the cure of cystocele, and

will leave a cicatricial bridge, which will narrow the vagina too much and interfere with subsequent labors.

If *BB'* are too near *AA'*, the cervix will be thrown excessively far backward into the hollow of the sacrum, and there may be too much tension to permit of a satisfactory union. These points having been selected and held in tissue forceps or marked with scissors, the point *C* is next selected. This lies in the median line and is the lowest portion of the anterior wall which can be brought without tension to the junction of the points *BB'* when held together.

The point *D* is then selected. It lies in the median line, and its exact situation is unimportant, but the tissues come together most conveniently when it is about three-quarters of an inch anterior to the cervix.

The crescentic area of the vaginal wall thus outlined is now removed by means of scissors after it has been thoroughly separated by blunt dissection from the wall of the bladder. The separation of the bladder is continued above the point *D* between the bladder and the cervix and the broad ligaments, nearly to the level of the vesico-uterine peritoneum, and as widely as possible to the side. This is a very essential step in the operation, permitting, as it does, the complete replacement of the bladder and a considerable elevation and backward displacement of the cervix, which is in itself a fairly effective remedy against the prolapse, which is always present, and against reformation of the cystocele.

The first suture is entered as nearly as possible in the median line, about one-quarter of an inch below *C*, and made to pass deeply through the whole thickness of the anterior wall, to emerge at the free edge at *C*. It is reëntered at the point *B*, where it again passes deeply through all the tissues of the vagina, to emerge slightly above *B*. It is thus free from the tissues except as it passes through the whole thickness of the vaginal walls at or about the points *C* and *B*.

A similar suture connects *C* and *B'* on the opposite side. A third suture passes through all the tissues of the wall on the one side at *B*, to pass freely across the denuded surface without entering the tissues until it reënters the vaginal walls on the opposite side at *B'*.

These three stay sutures make up the only important and supporting portion of the suturing. The remaining part consists only of a running whip-stitch, designed, first, to secure accuracy of apposition of the remainder of the cut edges, and second, and more important, to control hemorrhage.

In tying the sutures, the following procedure is most convenient. The first stay suture is drawn tight, but not tied, thus approximating the points *C* and *D*, and is so held by an assistant. The point *D* is then seized by tissue forceps and approximated to *B*, thus bringing into evidence one of the divisions of the four-leafed clover, which will be formed by tying the three stay sutures. The tip of this first leaf of the clover is then seized by forceps, and its sides are whipped together by a running

suture, which passes through the cut edges of the vaginal wall only, but must include the whole thickness of the wall in order to control hemorrhage. This first of the four divisions of the clover having been thus closed, the same thing is done with the upper leaf of the other side. The three stay sutures are then tied, and the two lower leaves of the four-leafed clover are easily whipped together and the operation is completed.

The After-treatment of Cases of Abdominal Section. A considerable amount of discussion has taken place during the past year as to the relative merits of different plans of treatment of celiotomy cases.

Use of Cathartics. My own plan has undergone practically a reversal, and whereas I formerly made an urgent effort to secure a movement of the bowels within twenty-four hours, I now disregard them for several days, provided the patient is doing well.

Byford[1] moves the bowels soon after operation. At any rate, he does so when there is any chance for loops of intestine to remain in contact with injured or abraded surfaces.

The plan which he finds satisfactory is as follows: A full dose of cascara is exhibited two hours before the operation, and an ounce of Hunyadi water is given every hour after recovery from the anesthetic, until the bowels move and flatus is passed freely. If there is no voluntary bowel movement within twelve hours of the operation, a high enema of three ounces each of glycerin and water is administered every two or three hours, according to the emergency. Instead of Hunyadi, citrate of magnesia may be given.

If flatus does not pass freely at the end of twenty-four hours, or if there is no evidence of active peristalsis, he adds an ounce of the spirits of turpentine to the enema and has the patient retain it as long as possible. Sometimes a high ox-gall enema acts better than glycerin; it may be used with or without the addition of turpentine. My own plan several years ago was much like that of Byford. I used not only the ordinary high compound enema (Epsom salt, glycerin, turpentine, and oil), but also one of pure glycerin and one of alum ($\mathrecal{3}$iv–$\mathrecal{3}$j to the pint). At present my custom is to relieve distention, if any occurs, by passing a rectal tube or by means of a simple or a high compound enema, but to give no cathartics by mouth for several days.

Use of Sedatives. Where there has been considerable trauma during an operation, and there is much pain afterward, Byford[2] applies an ice-bag to the abdomen rather than give opiates. The ice-bag and an enema containing 30 grains of chloral usually alleviate the pain and nervousness and sometimes the nausea, without inhibiting peristalsis.

I have also lost any objections I may have had to the use of small doses of morphine, grain $\frac{1}{16}$ to $\frac{1}{8}$ (combined with atropine), given hypo-

[1] American Journal of Obstetrics, vol. lvi, p. 79   [2] Loc. cit.

dermically after operations. It is a boon to the patient and is devoid of harm.

POST-OPERATIVE COMPLICATIONS INVOLVING THE ALIMENTARY TRACT. Simpson[1] discusses with some detail the postoperative complications which involve the alimentary tract. He mentions the following:

Functional disturbances of the alimentary tract itself, due to the anesthetic, to slight traumatism from handling the intestines or packing them out of the way, to decomposition of intestinal contents, to the absorption of poisons from the alimentary tract, etc.

Functional and organic affections of other structures of the body: such as local or general peritonitis, and postoperative acute toxic hyperemia of the kidneys, each of which conditions gives a definite and characteristic series of alimentary symptoms.

Organic lesions of the alimentary tract itself, such as intestinal adhesions, fecal fistula, intestinal obstruction, thrombosis of the mesenteric veins, acute dilatation of the stomach, etc.

The most striking functional disturbance of the digestive tract following operation are nausea and vomiting and meteorism, with or without excessive or diminished peristalsis and abnormal discharges. The significance of these phenomena vary with their individual characteristics, the time of appearance, the duration, and the associated disturbances.

The vomiting due to an anesthetic begins before or shortly after the patient becomes conscious, and is attended with retching and at times nausea. Its frequency and duration are almost an exact index as to the quantity of ether taken in excess. When the patient has been saturated with *ether*, the vomiting sometimes persists for eighteen to twenty-four hours and merges into that due to renal insufficiency.

The emesis of postoperative acute hyperemia of the kidneys commonly begins eighteen to twenty-four hours after operation. It is slight in amount, accompanied by decided nausea and retching, frequent and persistent. The tongue is dry, the quantity of urine grows progressively less, and albumin and casts become more and more abundant. When the condition is recognized, and a hot-air bath is given, the excretory organs become active and vomiting ceases abruptly and completely.

The regurgitant or projectile type of vomiting is in striking contrast to the two other forms, and is due to meteorism, ileus, or acute dilatation of the stomach. It rarely begins earlier than twelve hours after operation, and is characterized by large quantities of bile-stained fluid, which roll from the mouth with very little effort or nausea.

Two other functional complications of the intestine, which may rarely occur, are dynamic ileus and poisoning by the yellow iodide of mercury. Little is known of the pathology of dynamic ileus, but Simpson is con-

---

[1] American Journal of Obstetrics, vol. lvi, No. 3, p. 332.

fident of the occurrence of this lesion, although many able surgeons have doubted its occurrence, asserting that the contraction of the intestine observed at autopsy was a postmortem change.

Yellow iodide of mercury poisoning was seen in a case in which iodoform drainage had been used and calomel had been exhibited on the third day. In twenty-four hours the patient had twenty bloody stools, accompanied by marked tenesmus. Iodides were found in the urine and in the saliva. The patient had absorbed iodine from the gauze, and was eliminating it into the bowel as iodides and iodates; the calomel combined with it giving the yellow iodide of mercury in toxic dose.

Acute Dilatation of the Stomach. Acute dilatation of the stomach is one of the rarer postoperative complications. During the last five years more than 80 cases have been reported, 40 of which followed abdominal, including kidney, operations. The gravity of the affection is probably overstated by the reported cases. Thus, of 124 cases reported to date, 86 have died, apparently yielding a mortality of 69 per cent. Doubtless only the most striking examples have been reported, and a much larger number of mild cases have recovered and passed unnoticed.

The most recent idea advanced as to the etiology of these cases is that acute dilatation of the stomach is attributable to a sudden mechanical obstruction of the intestine. The duodenum is the usual site. Obstruction occurs where the superior mesenteric artery crosses the duodenum, and is supposed to be caused by a compression of the gut between the mesentery and the spinal column. In a very considerable percentage of cases the mechanical cause does not seem adequate to explain the clinical course. Indeed, according to the author, autopsy has in many instances demonstrated an entire absence of mechanical obstruction.

In regard to the etiology of some of these cases, Simpson calls attention to the following facts: In the nephritis of ordinary life nature not infrequently attempts to eliminate waste products through the stomach. In such cases nausea may be intense and vomiting incessant until relief is given. In the cases of postoperative acute toxic hyperemia of the kidneys the same symptoms obtain until the renal and the other secretions are unlocked. In a very considerable number of the reported fatal cases of acute dilatation of the stomach the kidneys have actually been operated upon, and in many other cases the definite statements have been made that the urine was scant and loaded with albumin and casts.

In view of these facts, the author believes that in some instances acute dilatation is merely a terminal symptom of fatal toxemia, due to renal or hepatic insufficiency. When nature attempts to eliminate the poison through the stomach, the latter becomes poisoned, exhausted, and paralyzed, thus precipitating an acute dilatation and sudden collapse.

In the treatment of such a condition, efforts should be directed not alone to relieve the symptoms, but to remedy the underlying cause as

well. The treatment which seems to have yielded the best results in respect to the stomach itself includes an inverted prone or knee-chest position to relieve mesenteric tension and compression, evacuation of the stomach, administration of food by the bowel, and of stimulants beneath the skin.

TREATMENT OF POSTOPERATIVE NAUSEA. When retching is severe and nothing is brought up, Lapthorn Smith[1] gives the patient two or three tumblers of hot water, with a few soda-mint tablets dissolved in them, for the purpose of washing out the stomach. When this has been accomplished, the vomiting generally ceases.

If the vomiting becomes troublesome, there are other simple means of arresting it. A towel wrung out of ice water, folded over and over until it is four or six inches in size, may be put on the throat and changed every quarter of an hour or oftener. A mustard plaster may be applied to the pit of the stomach. Best of all is a rhubarb and soda mixture containing ten drops of the spirits of chloroform to the dose. A teaspoonful every two hours is given, and although at first it may be rejected, a little remains and soothes the stomach for the next dose. Later, a tablespoonful can be taken three times a day; it neutralizes the acidity and cleans the tongue.

In my own cases of persistent nausea I have found nothing of so much service as lavage followed by the instillation of two ounces of a saturated solution of Epsom salt.

POSTOPERATIVE COMPLICATIONS AFFECTING THE KIDNEYS. In view of the importance which Simpson attaches to the kidneys in the etiology of postoperative nausea, the investigations of Tracy are of considerable moment. He[2] believes most thoroughly in a careful quantitative and qualitative examination of the urine preceding operations. If this is not done, many patients with nephritis and occasionally a patient with pyelitis will be given an anesthetic. In the majority of cases this aggravates the lesion, at least temporarily; in some cases it causes collapse from toxemia during, or death some time after, the operation.

In a study of the urinary analysis of 228 gynecological cases subjected to operation, it was found that of 123 celiotomy patients, 46, or 37 per cent., suffered from some change in the kidneys. Kelly, in 200 cases following abdominal operation, found casts in 30, or 15 per cent. From these figures it will be seen that irritation of the kidneys is a common complication following abdominal operation. Fortunately, however, in a majority of cases the condition is transitory, and under appropriate treatment clears up within an average of six days.

Tracy calls attention to the fact that patients suffering from renal insufficiency may develop symptoms which resemble those of peritonitis. He believes that the condition is due to a partial paralysis of the bowel,

[1] American Journal of Obstetrics, vol. lvi, No. 1, p. 81.
[2] Ibid., No. 3, p. 358

occasioned by the toxemia. The diminished peristalsis is followed by fermentation, distention, and reflex vomiting, the case resembling those of uremia described by Osler, in which the symptoms were chiefly gastro-intestinal, and disappeared as soon as the kidneys began to act normally.

Great improvement will be observed in postoperative irritation of the kidneys if 2 or 3 liters of salt solution are given by the bowel at the close of the operation. Since this treatment has been adopted it has been found that the quantity of urine passed in the first twenty-four hours has been decidedly increased. Irritation of the kidneys has occurred less frequently and the degree of irritation is less marked.

In the treatment of the suppression of urine following operation, salt solution given by the bowel or beneath the skin is of decided advantage. At the same time, hot bags should be employed, and spartein sulphate, in dose of 0.065 to 0.130 gram as recommended by McGuire, should be given hypodermically at intervals of four to six hours.

POSTOPERATIVE THROMBOSIS AND EMBOLISM. G. Brown Miller[1] has recently discussed the subject of postoperative thrombosis and embolism. In the etiology of thrombosis he ascribes great importance to sepsis. There is an intimate relation between postoperative thrombosis and embolism and sepsis. Although infection is probably not the cause of the majority of the cases of postoperative thrombosis, it plays an important role in its causation. Furthermore, thrombosis and embolism play a large part in the conveyance of an infection from one region of the body to another.

A thrombus when first formed is parietal or mural, but by continued growth it may fill the vessel and become an occluding or obstructive thrombus. A thrombus may be continued along the course of the thrombosed vessel into a communicating vessel. A thrombus may also start from an embolus of thrombotic material.

According to their etiology, thrombi have been spoken of as (*a*) inflammatory, (*b*) traumatic, (*c*) compression or dilatation thrombi, and (*d*) marantic.

Inflammatory thrombi are produced through acute or chronic inflammation of the wall of the bloodvessels. As a consequence of the inflammation the wall is thickened and the endothelium is injured.

Traumatic thrombi are occasioned by injuries to the vessel wall. To this classification belong those thrombi caused by ligating, severing, or tearing a vessel.

Compression or dilatation thrombi are caused by a slowing or stagnation of the blood stream. The compression may be caused by tumors, exudates, etc.; the dilatation may be due to a loss of elasticity, or an excessive thinning of the vessel wall.

[1] American Journal of Obstetrics, vol. lvi, No. 3, p. 347.

Marantic thrombi result from diseased conditions of the blood, degeneration or weakness of the heart, and slowing of the blood stream.

In the causation of postopeiative thrombophlebitis, the important work of Carrel and Guthrie on the anastomosis of bloodvessels and the transplantation of viscera seems to show that infection and injury to the vessel wall are of primary importance. In their experimental work, when the surgical technique was rigid and the endothelium of the vessels was accurately adjusted, thrombosis occurred but rarely. That infection is not the most important element in the postoperative variety seems to be indicated by the fac that postoperative thrombophlebitis occurs most frequently in the veins of the lower extremity on the left side no matter where the seat of operation. This fact may be explained by a combination of the etiological factors mentioned, plus anatomical peculiarities.

Thrombi are more likely to form after operations for myoma or carcinoma of the uterus and for large ovarian tumors. In these cases there is a certain anemia, both from the general ill health and in many cases from the large quantities of blood lost before and during the operation. The number of white blood corpuscles, blood platelets, and the amount of fibrin are relatively increased and the blood may be rendered more liable to coagulate. Injuries and diseased conditions of the vessel walls and a stagnation or a slowing of the blood current must come into consideration. The vessel wall is often dilated or otherwise diseased, from compression by the tumor. The blood current is slowed from the weakened or diseased heart, the recumbent position, the small amount of fluid ingested, the loss of blood, and the distance of the part from the heart.

The increased frequency with which thrombi occur in the left leg may be explained by the passage of the left iliac vein beneath the rectum or the sigmoid flexure of the colon and the right iliac artery. Owing to its greater length and its course obliquely across the posterior wall of the pelvis, this vessel is subjected to greater pressure and trauma before operation in case of large tumors, and, as a consequence, there is a greater liability to disease of its walls and more likelihood of a stagnation of blood after operation.

Schenck found that thrombosis in the veins of the lower extremity occuired more frequently after operation for the removal of fibroid tumors, ovarian cysts, and carcinoma of the cervix. Albanus reported 53 cases of venous thrombosis in a series of 1140 laparotomies, and all but 1 occurred either in the pelvic veins or in those of the lower extremities. The operations, so complicated, were done on the various abdominal organs as follows: Esophagus, 1; stomach, 8; appendix, 10; large bowel, 3; liver and gall-bladder, 7; subdiaphragmatic area, 2; small bowel, 5; female genital tract, 19.

Sonnenberg, in 1000 operations for appendicitis, encountered 30

cases of thrombosis, distributed as follows: Right leg, 9; left leg, 6; both legs, 2; portal vein, 2; inferior vena cava, 1.

Clark, in 3000 laparotomies, found 42 cases of femoral thrombosis; 31 out of 38 cases following pelvic operations were operations for fibroid tumor of the uterus, ovarian cyst, and cancer of the uterus.

Miller believes that thrombosis in the *ovarian veins* occurs oftener than is generally thought, the symptoms being obscure and the disease escaping observation except in fatal cases, when an autopsy is performed.

It is probable also that thrombosis of the *portal* or *mesenteric veins* occurs much more frequently than is usually supposed. Unless complete occlusion takes place, or the process is septic, it may readily escape observation. Complete occlusion must be rare, as infarction of the intestine is very infrequent.

Portal or mesenteric thrombosis is most apt to occur after resection of the intestine, gastro-enterostomy, operation for incarcerated hernia, appendicitis, volvulus, intussusception, and cholelithiasis. Most lung affections following operation for incarcerated hernia are believed by Gussenhauer to be embolic in origin. The emboli are secondary ones, following primary emboli which have lodged in the liver.

Thrombosis of the *renal* vessels following operation is very rarely recognized, but probably does occur; it would be most likely after resection or incision of the kidney.

Thrombi form in the *heart* on the valve leaflets, and then they are usually the result of infection. Thrombi also form in the cavities, especially the auricles, from infection or from a slowing of the blood current resulting from chronic disease of the valves or of the heart muscle.

The heart may be the source of many of the postoperative *pulmonary* emboli, whose origin cannot be discovered. Thrombosis and embolism of the *coronary* arteries may also occur, and should always be considered in looking for the causes of sudden death.

Thrombi may soften, break down, become organized, or undergo calcification. Simple softening is thought to be due to the action of a ferment. Septic and putrid softening are attributed to the action of pyogenic and putrefactive bacteria, respectively. These softenings may lead to the dislodgement of pieces of the thrombi, which are then known as emboli, and are transported by the circulation to various parts of the body. When calcification occurs, phleboliths or arterioliths are formed.

Organization of the thrombus, *i. e.*, the substitution of vascularized connective tissue, takes place in the majority of cases. The tissue which replaces the thrombus is derived from the wall of the bloodvessel, new bloodvessels springing from the vasa vasorum, and the endothelium and the connective tissue being derived from like cells in the vessel wall. Lacunar spaces lined with endothelium may form throughout the thrombus, the latter becoming gradually disintegrated and absorbed.

The newly formed tissue becomes fibrous and contracts, and there may result either a fibrous plug or a cavernous structure with blood spaces. The lumen of the vessel may be restored, with, perhaps, a few bands crossing it.

EMBOLISM is defined as the impaction in some part of the vascular system of any undissolved material brought there by the blood current. The transported material is called an embolus. Emboli are usually derived from thrombi. Fat, air, and tumor cells may form an embolus, but are of little moment in the postoperative variety. A thrombus from the systemic veins or the right heart causes pulmonary embolism, except in those cases of crossed embolism where the embolus passes through an open foramen ovale, or where the embolus is stopped in the heart. When a piece of a thrombus is detached from the left side of the heart, the pulmonary veins, or the systemic arteries, the embolus lodges in a systemic artery. Finally, an embolus from the portal system of veins lodges in the liver.

As before stated, there is an intimate relation between sepsis and thrombosis and embolism. Postoperative cardiac disease is usually due to the action of bacteria which enter the blood current and produce endocarditis, pericarditis, and, at times, cardiac thrombi. The bacteria associated with wound infection and the gonococcus, the bacteria which are most frequently encountered in gynecological operations, cause a considerable proportion of the cases of acute endocarditis. The acute endocarditis thus set up forms a thrombus from which, in certain cases, emboli of the postoperative variety are derived which lodge in the lungs, kidneys, spleen, mesenteric arteries, the brain, or the arteries of the extremities.

We have already seen how secondary emboli from the liver may be transported to the lungs. A large part of postoperative pulmonary complications are probably due to embolism. Miller and Sonnenberg are both of this opinion. Pneumonic infiltrates and pleurisies are usually the result of pulmonary embolism. Albanus reports 2 per cent. of cases of recognized pulmonary embolism in 1140 laparotomies, and found, at autopsy upon patients who had shown no symptoms of thrombosis, that in many cases a fresh lung embolus was the cause of death, or discovered small emboli or infarcts independent of the cause of death in the individual case.

Gebele, in 1196 laparotomies, found 14 cases of pulmonary embolism, Burkhardt saw 12 cases in 236 operations for fibroid tumor, Pietrzi-kowski found 14 cases of what he considered pulmonary infarct in 210 cases of incarcerated hernia.

Miller believes he is safe in saying that in the best surgery practised today more deaths occur as a result of pulmonary embolism than from any other one cause in operations for the removal of fibroid tumors and ovarian cysts.

The embolus usually comes from a thrombosis in the veins of the pelvis or the lower extremity. The right heart is probably the next most frequent source; while any of the systemic or the portal system of veins may be the origin of the trouble. As in the large majority of cases embolism is the result of a thrombosis of the pelvic or the femoral veins, the complication occurs more frequently after operations on the uterus and ovaries. It also occurs in a considerable proportion of cases after operations on the intestinal tract, including incarcerated hernia and appendicitis.

Renal embolism is probably next in frequency to pulmonary embolism. It is mainly due to fragments derived from the valves of the left heart and from thrombi in the left heart and the aorta. Renal embolism is commonly septic.

Very little can be found in the literature regarding postoperative thrombosis and embolism of the splenic vessels. The emboli are chiefly derived from the heart, and are usually infectious. Splenic embolism is ranked next to renal in the order of frequency.

Embolism and thrombosis of the vessels of the brain are apparently rare complications of gynecological operations. Robinson states that 4 per cent. of postoperative embolism cases are cerebral. Miller has had 2 cases which he regarded as such; 1 occurred after a fibroid operation, the embolus lodging probably in the left middle cerebral artery, producing transient hemiplegia and aphasia. The other case followed curettage for retained secundines, and occurred in the retina. The emboli in these cases are most likely the result of disease of the heart and the bloodvessels.

Miller's paper is an admirable presentation of the subject of postoperative thrombosis and embolism. Several other articles have appeared during the year, notably one by Morley,[1] who analyzed 11 cases of postoperative thrombophlebitis among 1756 laparotomies and plastic operations in the gynecological service of the University Hospital at Ann Arbor. He reviews the literature and observes that thrombophlebitis has still an unknown etiology; the complications can follow almost any operation; pulmonary embolism is often coincident with thrombosis; the period of incubation is from the ninth to the twentieth day; the left side is more often affected; the mortality is practically nil.

Grant,[2] who has studied this subject, believes that phlebitis of the epigastric, the iliac, the femoral, the saphenous, and the tibial vessels, occurring late after a perfectly aseptic operation, with prompt healing of the wound, is probably not septic, although it is very difficult of satisfactory explanation.

In the absence of convincing evidence, it is not rational, he says, in the

---

[1] Surgery, Gynecology, and Obstetrics, vol. v, p. 299.

[2] Journal American Medical Association, February 16, 1907, vol. xlviii, No. 7, p. 567.

best and the cleanest days known to surgery, to assume an infectious origin in these cases.

He does not think the affection can be attributed to the recumbent posture or to the injury of small vessels. He belives that the composition of the blood must be an essential factor in the cause of thrombophlebitis in these cases, and that careful examination of the blood should be made before and after operation. This done systematically would probably throw light on a puzzling subject.

Pfaff[1] concludes, in reference to phlebitis following abdominal operations, that many of these cases are simply extensive aseptic blood clots without any true inflammation. Abnormal plasticity of the blood must exist before thrombosis is caused by surgical traumatism. The clot is usually the seat of a mild form of infection which is introduced into the wound at the time of the operation, and in turn invades the wall of the vein.

As stagnation is such an important element in the etiology, earlier removal from bed will undoubtedly reduce the liability to thrombosis. As an increased plasticity of the blood is essential to the development of the disorder, the blood should be tested and its condition corrected before operation.

PROPHYLAXIS OF POSTOPERATIVE THROMBOPHLEBITIS. Brothers[2] thinks that, next to asepsis, the importance of rest must receive consideration in the prophylaxis of postoperative phlebitis. Given a case of suppurative appendicitis or adnexitis with a drained wound, and there is almost a unanimous opinion that rest in bed is advisable, for most cases of postoperative phlebitis occur in just these patients. After a clean operation, however, which permits complete closure of the wound without drainage, a retardation of the blood current may play an important rôle in producing coagulation and thrombosis with phlebitis.

The logical indications under such circumstances will be early movement and early removal from bed, instead of absolute and prolonged rest. The heart action and the circulation will be distinctly accelerated by this plan. In addition, liberal nourishment, friction, and massage assist in quickening an otherwise sluggish circulation.

Some operators have done a large number of aseptic operations, keeping their patients in bed during the usual prescribed period of time, without meeting a single case of postoperative phlebitis. Polk has had 100 consecutive hysterectomies, at Bellevue Hospital, without a single instance of this complication.

With the opposite plan of treatment, Ries, Boldt, Chanler, and the author report 1000 cases of abdominal section in which there were only 2, or possibly 3, cases of this complication, and they were of a very mild character. All of these patients were allowed to move about early.

---

[1] American Journal Obstetrics, vol. lvi, p. 630.

[2] Ibid., vol. lv, No. 5, p. 609.

TIME OF REMOVAL FROM BED AFTER OPERATION. Last year I gave, *in extenso*, Boldt's practice of allowing or even of urging patients to leave their beds a short time after laparotomy. As just noted, Brothers believes this practice will have considerable influence in the prevention of postoperative thrombosis and embolism.

It is his firm conviction that in the near future 80 per cent. or more of all abdominal sections will be ordered out of bed at the end of the first week. It is perfectly safe for many of these cases to sit in a chair after three or four days. He is opposed, nevertheless, to the extreme position taken by Ries and Boldt, who urge patients to leave their bed within twelve to twenty-four hours of operation. Exceptions to early mobilization are found in the cases where drainage has been instituted, when there is febrile disturbance, and in the presence of organic disease of the heart, lungs, or kidneys.

According to Noble,[1] getting patients out of bed soon after an operation favors the development of hernia, and he questions whether it has ever resulted in the prevention of postoperative thrombophlebitis. He thinks that the rest in bed after operation is not only without disadvantage so far as the loss of tone is concerned, but that it does a great deal of good to patients who have been reduced in strength by hemorrhage or by sepsis.

Hartog[2] reports 39 cases in which the patient was allowed to get out of bed soon after abdominal or vaginal celiotomy. The postoperative treatment of a celiotomy patient should never be schematic. A number of factors should always be borne in mind, namely, the condition of the internal organs, the indications for operation, the form of the operation, and the complications during operation and after it.

It was customary formerly at Landau's clinic to keep celiotomy patients in bed for some time and have them lie as quietly as possible. In the cases which Hartog reports this practice was not followed. The day after the operation the patient was allowed to move, to draw up the legs, to lie upon the side, or to elevate the upper part of the body. Patients whose wound was closed entirely without drainage, and whose convalescence was smooth, were allowed to get up, as a rule, about the middle or at the end of the first week.

An indication for the time at which this should be allowed was found in the wish of the patient herself. When the patients were asked whether they desired to get up, and they answered "yes," there was no objection to their doing so within two days of the operation. An exception was made only in plastic and in hernia operations.

The author draws attention to the fact that early removal from bed can be practised only in case the abdominal incision is sutured in layers

[1] American Journal of Obstetrics, vol. lvi, No. 3, p. 328.
[2] Berl. klin. Woch., xliv, Nr. 1, p. 15.

and is fortified by relaxation sutures of silkworm-gut which pass through all the layers of the abdominal wall with the exception of the peritoneum.

In none of the cases treated by this plan was there any complication which could be attributed to the early rising from bed. The patients were ready for discharge considerably earlier than usual, and every one left the clinic with a well-knit scar and without a binder.

It is true that when the patients first get up they have a small amount of drawing pain in the incision, but they bear this gladly for the pleasure of going about.

Another advantage is that convalescence is quicker, in consequence of fuller respiratory action, an improvement in spirits, an increase o appetite, and an improvement in digestion. The circulation of the blood is more active and certain forms of thrombosis and embolism are avoided, for which prolonged rest in bed is responsible. Such cases of thrombosis usually occur two or three weeks after aseptic operations in anemic patients and in those having heart affections (myoma patients).

Resumé of the Subject of Postoperative Treatment. Baldy[1] gives a very sensible *resumé* of the whole question. He says that nothing could be more diametrically opposed than one surgeon opening the bowels of his patient by the use of laxatives and enemata within twenty-four hours after an operation, and another allowing the bowels to remain locked for from five to eight days. And yet each method had its advantages, and the result in both has been good in various hands.

What is more antagonistic than the feeding of one patient as soon as an appetite is developed, and the practical starvation of another (on slops) for an indefinite time? The free use of morphine and its absolute prohibition? The administration of a stimulant and its absolute refusal? The enforcement of rest in the dorsal position, and the privilege of free movement? The prolonged rest in bed, and the enforced getting up within from twenty-four hours to a week? The continued administration of drugs on every pretext, and their almost absolute withdrawal? And yet it must be admitted that all of these methods, diametrically opposed as they are, had been used with the utmost success, and would continue to be so used.

Personally, he has been guilty of all these methods from time to time, and if his surgical experience has taught him anything, it has taught him this, namely, in the routine case, if his surgery has been satisfactory, and the patient has left the operating table fiee from sepsis, hemorrhage, and shock, the after-treatment is o little importance so far as recovering from the surgery is concerned; it is principally of importance as to the relative comfort of the patient. What to him formerly appeared of great moment, is now, in the light of a wider experience, amusing, and the petty details being continually threshed over seems like making mountains out of a molehill.

[1] American Journal of Obstetrics, vol. lvi, No. 1, p. 86.

He has found that after the administration of ether a patient is both thirsty and sick at the stomach, and that anything placed in the stomach will further irritate that organ. Rest and time are the great panaceas; consequently, thirst is quenched by rectal enemata of warm water, often repeated; nothing is administered by mouth, either food, drink, ice, or medicine. By the end of twenty-four hours nature has asserted herself, the irritation.of the stomach has passed, the thirst is quenched, and the stomach is ready to digest and absorb.

By this time the sting of the pain from the operation is considerably abated, and the patient chafes under the enforced dorsal position. What is to prohibit her from drawing up her knees, shifting her body, or turning on her side? Absolutely nothing. Turning will do no harm; it will rest, it will relieve anxiety, and will often dissipate pain by encouraging peristalsis and the passage of flatus. If a patient has an appetite and desires something to eat, why deny it, or why make her swallow slops when she craves solids? What is there, forty-eight hours after an operation in the routine case, which prohibits the eating of anything a person craves? He knows of nothing, and consequently allows nature to dictate in all these matters.

Ordinarily, most people feel well when their bowels are moved daily, and there is no exception to this when one is sick. Because one gets well and has not had much tympany when the bowels were locked is no reason why the surgeon should violate the laws of nature when he knows that nature has at this time the extra burden of two extraneous and noxious substances, which may with benefit be thrown off—ether and opium. He sees no reason why a bed-ridden person should be allowed to accumulate and absorb ptomaines and noxious substances any more than a well one. The effect of the first movement of the bowels on a patient is most marked for the better, and the earlier this is secured the sooner is the patient off the surgeon's mind.

There is probably no great advantage in keeping the ordinary patient in bed longer than two weeks, and there is a growing tendency toward lessening this time. So far as surgery is concerned, this practice is perfectly rational. Wounds in other parts of the body heal up soundly in this space of time, and, if anything, peritoneal wounds heal more quickly.

In many cases of abdominal surgery, however, there is a twofold object to be obtained. This is peculiarly so in the class of chronic or semi-chronic cases so often dealt with by gynecologists. A very large percentage of these patients, especially the hospital cases, are broken-down neurasthenics, half-starved, ill-nourished, sexually abused women, and the surgery is only a first step toward their recovery. Very many of these women, especially those operated upon for cystic ovaries, displaced uteri, torsion of the tube, and chronic appendicitis, or appendiceal colic, would be very materially benefited without an operation at all.

In such cases an operation, followed by an enforced getting up in two weeks, is irrational, and in twenty-four hours, is brutal. What these people need most of all is rest—physical, dietetic, mental.

A few weeks' quiet in bed is of no serious import in the convalescence of patients, especially when these weeks of careful feeding and nursing and rest are productive of a very great amount of good health, such as many of these people have not known for years.

A surgical case may be gotten out of bed and home in a week or ten days, but this is not the best for them, and does not mean that their convalescence is more rapid. The aim should be not to get them home in the quickest possible time, but to give them the best amount of stored-up health and energy with which to successfully meet the future. One who has gotten out of bed with health fully restored is surely more competent to meet the necessities of everyday life than one who has been quickly put upon her feet with little regard to her general condition.

DISEASES OF THE BLOOD. DIATHETIC AND METABOLIC DISEASES. DISEASES OF THE SPLEEN, THYROID GLAND AND LYMPHATIC SYSTEM.

BY ALFRED STENGEL, M.D

THE BLOOD.

Pernicious Anemia. ETIOLOGY AND PATHOLOGY. *Gastro-intestinal Origin.* The painstaking researches of many observers are constantly making clearer the fact that a large number of grave anemias, hitherto called primary pernicious anemias, can no longer be classified as such, according to the strict interpretation of that term, since etiological factors may be found to account for their existence. Beyond question, a large group of cases is encountered, which for lack of any discoverable cause, may still properly fall under the head of pernicious anemia. Nevertheless, such a diagnosis today is only justifiable after thorough and careful search has failed to reveal the presence of any one of a steadily increasing number of causative factors.

Among the most noteworthy recent contributions to the etiology of pernicious anemia is the work of Tallquist.[1] He made the remarkable discovery that in the proglottides of the tapeworm (bothriocephalus latus), there is present a lipoïd substance with powerful hemolytic properties. This substance is similar in action to proteolytic ferments, it is not excreted, it does not induce the production of an antibody, and is stable in the presence of heat. This hemolytic substance is only liberated from the sexually mature segments of the tapeworm when the segment becomes disintegrated. Experimentally, this lipoid substance is capable of producing distinct anemia, in which the number of red blood cells is diminished, their color index being raised, and in which there is either no change or only a slight diminution in the number of leukocytes with the occurrence of a relative lymphocytosis. Changes similar to those found in pernicious anemia are observed in the tissues of the animals in which such experimental anemias have been produced. Tallquist believes this is sufficient proof to explain the grave anemias resulting from the presence of the bothriocephalus. Certain organs in man, especially the intestinal mucosa, are capable of yielding

[1] Zeitsch. für klin. Med., lxi, Nrs. 5 und 6.

a lipoid substance similar to that derived from dissolution of the tapeworm segments, which possesses hemolysing properties. Tallquist suggests that the cause for certain cryptogenetic pernicious anemias, showing alterations of the intestinal mucous membrane and an absence of intestinal parasites, lies in this substance derived from the intestinal mucosa, which under certain conditions induces direct hemolysis, thus leading to the clinical picture of pernicious anemia. That similar hemolyzing substances exist in malignant growths, offers an explanation for the grave anemias of decidedly pernicious type which are so often associated with carcinoma of the stomach.

Hollis and Ditman[1] hold that toxemia of intestinal origin may be a likely cause of pernicious anemia. Their view is strengthened by the suggestive results obtained in the treatment of several cases. This treatment (to be considered later) they based upon the work of Herter, who has demonstrated the almost constant presence of certain anaërobic bacteria in the intestinal tract, which bacteria break down proteids into a form suited to the use of other putrefactive indol-forming organisms. In pernicious anemia an excess of indol is found quite uniformly; and in conditions where the oxidizing capacity is diminished, an excess of indol has been shown to produce toxic symptoms. Moreover, the anaërobic organisms produce strongly hemolytic substances which can pass through the intestinal wall and thus produce destruction of the portal blood. Hunter believed that in pernicious anemia hemolysis occurred chiefly in the portal system.

The existence of a relationship between gastro-intestinal diseases and severe anemias of the pernicious type has long been recognized and has frequently been described. Just how gastro-intestinal disease influences blood formation, or how it brings about blood destruction, is still unsettled. The three chief factors to which anemias of digestive origin are usually ascribed, are frequent macroscopic or microscopic hemorrhages, functional insufficiency of the blood-forming organs, and the destruction of red cells by a toxin. Tixier[2] has endeavored to show which of these three factors is the most potent in the production of grave anemias of gastro-intestinal origin. He points out that in cases of pyloric stenosis, unattended by any previous loss of blood, a degree of anemia exists that is equal to, or greater than, that found in pyloric stenosis with hemorrhages from an ulcer; and that after the same operative interference both varieties of cases show equal improvement in a given length of time. In typhoid fever, he has observed that the anemia which followed a number of severe hemorrhages was less severe that that which followed a protracted period of diarrhea. Tixier contends that these facts show that the loss of small quantities of blood in the course of ulcerative affections of the intestinal tract is not alone an important cause of the blood destruction.

[1] Medical Record, New York, February 2, 1907.
[2] La Semaine Médicale, xxvii, No. 25.

He considers diminished blood formation as only exceptionally a prominent factor in the production of gastro-intestinal anemia. In a large number of gastro-intestinal cases with marked malnutrition of long duration he found the bone marrow more than sufficiently active to insure blood regeneration under normal conditions. Indeed, in only 3 cases, 1 in an adult and 2 in young children, were there found any evidences of diminished blood formation in the bone marrow associated with a gastro-intestinal condition.

However, Tixier lays great stress upon the major role played by hemolysis in the grave anemias secondary to gastro-intestinal disturbances. Various groups of cases examined, showed the spleen and bone marrow to be not only functionally active but even hyperactive in the destruction of red blood corpuscles by a hemolytic agent. Experimentally he showed that the serum from animals rendered anemic by pyloric ulceration (without hemorrhage) contains, in suspension, a toxic substance which possesses the chief characteristic of a hemolysin and is capable of causing dissolution of the red cells in animals of the same species. Further experimental observations demonstrated that this substance in the serum of these animals possesses two independent and distinct properties: the first, since the more prominent, is its destructive action on the red blood corpuscles, while the second is "excitohematopoietic" stimulation of the blood-forming organs, especially of the bone marrow. The latter-named action occurs first, decreases in a short time, and disappears, while the later occurring globulicidal activity still persists. Such excitohematopoiesis may be seen clinically in the course of a grave anemia, in whïch stimulation of blood formation has ceased; when the occurrence of some severe acute infection introduces a hemolytic agent of another nature, as a result of which, active regeneration of the blood ensues.

In connection with the possible gastro-intestinal origin of certain of the so-called pernicious anemias, the changes in the stomach and intestines noted by Oestreich and Strauss[1] are of interest. These observers found an increase of the lymphatic tissue in the digestive tract, and believe that this increase has some special relation to the disease. This condition was present in 12 out of 24 cases of pernicious anemia they examined, and in a number of them the increase of lymphoid tissue in the digestive tract, especially in the stomach, was associated with an increased number of lymphocytes in the circulating blood.

These findings were confirmed by Mosse,[2] who, upon careful histological examination of tissue from a case of pernicious anemia, found in the bone marrow megaloblastic degeneration with marked diminution of the lymphocytes, and in the spleen atrophy of the Malpighian bodies. In the same case marked lymphocytic infiltration was present in the stomach and the intestines; in the former, in particular, it was so great

[1] Berl. klin. Woch., xliv, Nr. 41.   [2] Ibid., Nr. 26.

as to cause partial destruction of the glandular elements. These diametrically opposite conditions of bone marrow and spleen on the one hand, and of the stomach and intestines on the other, strongly suggest the occurrence of a compensatory lymphocytic hyperplasia in the gastrointestinal tract in some cases of pernicious anemia.

Hunter[1] concludes that progressive pernicious anemia should not be regarded as anything but a "definite, specific, hemolytic, infective disease." He calls attention to the frequency with which previous oral, gastric, or intestinal trouble of many years' duration is associated with this disease. He shows the significance and importance, as an etiological factor in pernicious anemia, of the most commonly overlooked form of infection, oral sepsis (infective glossitis in particular).

Bunting[2] records dental caries, pyorrhea alveolaris, and a chronic inflammatory process at the base of the tongue in two cases of pernicious anemia in which the oral cavity was carefully examined by him. In one of these cases, he found the tongue lesion associated with a shallow ulceration; and in the other, with a deep sclerosis with hyperplasia of the mucous glands.

The *anemia of ankylostomiasis,* according to Boycott,[3] is only to be called pernicious in a general sense. He insists that such an anemia must not be confused with a true pernicious anemia, since the ankylostomia anemia is merely a great dilution of the blood, whereas the latter is due to a true deficiency of hemoglobin. He calls attention to the fact that only a small number of those infected with ankylostomia show any marked anemia, and that, in general, the degree of anemia depends upon the number of worms present.

Infectious Origin. That infections play an important part in the production of grave anemias, which if not strictly pernicious are pernicious in type, is well established by many clinical observations. It is by no means clear just how these anemias are produced; for, although they are attributed to hemolysis, the factors governing this process are but incompletely understood and experimental studies are as yet insufficient. A number of instances have been reported recently in which grave anemias were associated with various forms of acute infection.

Mann[4] observed a severe anemia, apparently pernicious, although no jaundice or enlargement of the spleen was present, occurring in an eighteen-year-old girl, immediately following a typical attack of acute articular rheumatism. Carpenter[5] reports the case of a baby, aged eleven months, that for eight months had had a progressive pallor of the skin and mucous membranes, and that was brought to the hospital because

---

[1] British Medical Journal, November 9, 1907.
[2] Journal of American Medical Association, August 10, 1907.
[3] British Medical Journal, November 9, 1907.
[4] Münch. med. Woch., liv, Nr. 36.
[5] Journal American Medical Association, December 14, 1907.

of great weakness and prostration. The blood examination showed the hemoglobin, 17 per cent.; red corpuscles, 805,000; leukocytes, 8,480; color index, 1.06+. Microcytes, macrocytes, poikilocytes, normoblasts, megaloblasts, shadow cells, and polychromatophilia were all present. The urine, which contained albumin, casts, and pus, upon bacteriological examination gave pure culture of Bacillus coli communis. A week after admission to the hospital the child died, and at autopsy bilateral pyelonephrosis of some standing was present in addition to a terminal bronchopneumonia.

Two other cases of pernicious anemia associated with acute infections occurring in young children, are mentioned by Dumas and Poisot.[1] One was that of a child aged eleven years, who during acute miliary tuberculosis developed a pernicious anemia of the plastic type. The second case was that of a baby, aged twenty months, which from bronchopneumonia developed a marked anemia and septicemia. Staphylococcus aureus was isolated from all the organs, and there was proliferation of the bone marrow of the myeloid type with corresponding changes in the composition of the blood.

These same authors, Dumas and Poisot,[2] carefully reviewed the question of the relation of infection to grave anemias. According to their observations, nucleated red cells are more easily and more frequently demonstrated after infections experimentally produced in animals, than they are in human blood during the course of acute infections. Nucleated red cells, together with marked reduction in the number of these cells, do occur sometimes in variola, malaria, puerperal eclampsia, osteomyelitis, septicemia, and acute articular rheumatism. Despite the fact that the blood-forming organs of infants are generally considered easily stimulated, the phenomenon of nucleated red cell production, according to these observers, is not found in young children with any greater frequency than it is in adults, their occurrence being confined, for the most part, to von Jaksch's and Weil's disease.

In a case of congenital syphilis, with enlarged spleen and grave anemia, they were able to show the Spirocheta pallida in the blood and organs. *Syphilis*, especially tertiary, often causes pernicious anemia. These authors call attention to a group of cases, recently reported, in which there was fever, great prostration, and especially marked greenish pallor of the skin without localized visceral symptoms other than an enlarged spleen. In these cases the diagnosis was only possible through the bacteriological and histological examination of the blood. In addition to giving the picture of pernicious anemia, the blood showed the presence of pathogenic organisms. The typhoid bacillus and streptococcus were isolated. The authors hold that the anemia accompanying certain infections depends upon the hemolyzing property possessed by certain

[1] La Presse Médicale, xv, Nos. 39 and 40.
[2] Ibid., No. 47.

bacteria. Although, in this respect, there is extreme variability among organisms, the number of recognized ones has steadily increased since Ehrlich first isolated tetanolysin. Most bacteria acquire this property of hemolysis only after being grown on artificial media, but the streptococcus is a "naturally hemolytic" organism ever capable of bringing about the destruction of the red cells of man.

Experimental Anemias. Of all the problems facing the clinician and pathologist in the study of pernicious anemia, there is none which lends itself more readily to experimental investigation as the pathogenesis of this disease. Bunting[1] has summed up the present status of our knowledge concerning pernicious anemia from the experimental evidence that has been adduced thus far. He shows that in animals, the dog and the rabbit, anemias have been produced which, in both blood picture and marrow changes, differ in no particular from pernicious anemia as found in man. In addition to normoblasts, megaloblasts, and the characteristic changes in the size and shape of the red cells, the blood of these animals even shows a high color index and a leukopenia with relative increase of the mononuclear cells. In the bone marrow there is a preponderance of megaloblasts and large lymphocytes. These experimental anemias have been produced by the injection of a large number of substances, all of which have one characteristic in common; namely, that of being hemolytic. This fact is suggestive when we consider the importance attached to the role played by hemolysis in the production of pernicious anemia. In experimental secondary anemia, on the other hand, there is not such a nucleated red cell reaction in the circulating blood; there is a less abrupt decrease in the number of red cells, and the marrow shows the preponderance of normoblastic cells, characteristic to secondary anemia.

Bunting explains the reason why a toxin produces a pernicious anemia in one instance and in another a secondary anemia, on the following grounds, based largely on experimental work: When a hemolytic substance is absorbed into the circulating blood in such quantities that it not only destroys circulating red blood cells, but also injures the erythrogenetic cells of the bone marrow, atypical blood formation occurs and the picture of pernicious anemia results. A secondary anemia is produced when the absorption into the circulation of a toxic agent is so gradual that the toxin is completely anchored by the red cells, causing only their destruction, leaving the marrow not only uninjured but actually stimulated to the normal production of non-nucleated red blood cells.

Morris[2] has produced experimental anemias in rabbits by the use of pyrodin administered both through the stomach and subcutaneously. After careful histological study of the organs and blood of these animals he has been able to draw the following interesting conclusions:

---

[1] Loc. cit.   [2] Johns Hopkins Hospital Bulletin, June and July, 1907.

1. In rabbits such an experimental anemia is one of a higher color index, and results from injury to certain of the red blood cells which are then removed from the circulation by phagocytes in the spleen, bone marrow, and liver. This resembles the condition found in pernicious anemia in man.

2. The increased blood destruction leads to increased (compensatory) blood formation.

3. The stimulus to increased regeneration of the blood, whatever its nature may be, leads to heightened activity of the hematopoietic functions of the bone marrow, the occurrence of myeloid elements in the spleen, and occasionally the occurrence of these elements in the liver.

4. The changes occurring in the liver and spleen of the experimental animals are similar histologically, so far as the hematogenetic cells are concerned, to those seen in normal rabbit embryos at certain stages in their development; and it may be assumed, therefore, that the spleen and liver have taken up their embryonic function, *i. e.*, hematopoiesis.

5. The return of the embryonic function is in the reverse order of the disappearance.

6. Hemosiderosis of organs occurs as in pernicious anemia in man.

7. The weight of experimental evidence favors the theory of increased blood destruction (the toxic theory) rather than that of decreased blood formation as the chief factor in the production of primary pernicious anemia in man.

Meyer and Heineke,[1] in their studies concerning the mode of blood formation in grave anemias, obtained results similar to those of Morris. From their observations they are led to believe that in pernicious anemia the compensatory blood-forming organs, the liver and the spleen, take on a picture and assume the function similar to those in embryonic life. The megaloblastic blood picture and high hemoglobin content of the red cells which occur in pernicious anemia these authors interpret as evidence of a reparative process.

Funck[2] has found that in certain blood diseases, as pernicious anemia, groups of cells assume a character similar to that of malignant cells. The power of resistance that these "malignant cells" exhibit toward toxic substances differs with the kinds; the ptomain isolated by Coley has a particularly deleterious effect upon them.

Howell and others have described the nuclear granules found in the red cells of cats, rabbits, and other animals after severe hemorrhages or in experimental anemias. These nuclear particles have the shape and appearance of nucleoli, and were supposed to result from shrinking or atrophy of the nuclei of red cells. Now, for the first time, they have been described in the human blood. Morris[3] has noted them in a case of

---

[1] Deutsch. Archiv f. klin. Med., lxxxviii, Nrs. 4 to 6.
[2] Berl. klin. Woch., xliv, Nr. 29.
[3] Johns Hopkins Hospital Bulletin, June and July, 1907.

the disease under consideration, in a child aged seven months, suffering from anemia pseudoleukemia infantum; in the grave anemia of a case of typhoid fever in which a blood crisis occurred, as well as in human embryos. Since they were frequently found in cells having active intercell nuclei, he regards their origin through atrophy of the nucleus as extremely unlikely in man at least. Morris considers these nuclear granules as evidence of regneration of the blood, and the cells in which they occur as younger forms of red cells.

APLASTIC ANEMIA. The division of pernicious anemias into the ordinary, or plastic, and the aplastic forms, together with a complete discussion of this latter type, was entered into fully in a previous number of PROGRESSIVE MEDICINE (June, 1907). The aplastic form, that is, a pernicious anemia in which medullary reaction is entirely wanting, and in which the young forms of erythrocytes are not found in the circulating blood, is as yet sufficiently rare to warrant the careful reporting of every case.

Blumenthal[1] has observed a case in a woman, aged foity-two years, who exhibited a tendency to rather excessive menstrual hemorrhages for some time before she came under observation. At that time her hemoglobin was 25 per cent., erythrocytes 740,000, leukocytes 3,600, and there was a relative lymphocytosis. Although there were no marked degenerative changes in the corpuscles, the erythrocyte producing function seemed entirely suspended. This patient had hemorrhages suggesting purpura, and suffered with progressive dyspnea. Death occurred in six weeks. At autopsy, the myeloid tissue was found completely supplanted by lymphoid tissue. Here, then, was a case in which the blood picture during life reflected accurately the arrested activity of the bone marrow. Blumenthal believes that in such conditions, the prognosis need not inevitably prove fatal, and suggests that if the normal chemical environment, necessary to the function of blood production, could be restored by improving the nourishment of the bone marrow, an arrest of the aplasia would follow.

A case reported by Crummer[2] occurred in a young woman, aged eighteen years. She had always been in excellent health, but two months before, she was put to bed because of pallor, weakness, and fatigue. She had had several attacks of generalized muscular pains in her body and limbs. The examination of this patient proved negative in every particular, except for her marked pearly white pallor. The blood examination showed the hemoglobin to be 17 per cent.; erythrocytes, 1,060,000; leukocytes, 1,533; color index, 0.88. Stained specimens of blood failed to show any nucleated red cells, there was no poikilocytosis, and no polychromatosis. The differential leukocyte count put the lymphocytes at 40 per cent. Just three weeks after going to bed

[1] Deutsch. Archiv f. klin. Med., xc, Nrs. 1 und 2.
[2] Journal of American Medical Association, December 21, 1907.

the patient died. Although no autopsy could be obtained, the author feels justified in considering this an undoubted case of aplastic anemia, and bases this diagnosis upon the coincidence of the clinical findings with "the essential features of aplastic anemia," as stated by Lavenson,[1] a complete discussion of whose article on aplastic anemia has already appeared in PROGRESSIVE MEDICINE.

SYMPTOMATOLOGY. Yet another division of pernicious anemia has been suggested by Plehn,[2] whose observations lead him to consider the disease under two headings: one group those in which the disease is not associated with hemorrhages, and another embracing those with hemorrhagic diathesis. The first group occurs chiefly in people past middle life. These patients do not feel very ill, and complain chiefly of weakness and indefinite disturbances of their digestive and cardiovascular systems. They show albuminuria, marked achylia, usually atrophy of the lingual mucous membrane, and often retinal hemorrhages. The blood of these patients shows the typical changes of pernicious anemia including absence of blood plates. All of the 25 cases which he included under this group terminated fatally He is inclined to regard these as the result of an intoxication from an enterogenous poison of unknown composition.

Plehn's second group is described less fully, but the disease clinically resembles that called Werlhof's disease. These cases differ from those in the first group in that their prominent feature is a marked hemorrhagic diathesis, lack of any disturbance in the gastric reaction, and the usually favorable prognosis. With one exception all of his cases in this group recovered.

Blood Changes. A series of 89 cases of pernicious anemia have been carefully studied by Emerson,[3] particularly with reference to the blood changes. He also makes some interesting observations on the relationship that exists between the blood picture and the subjective symptoms, emphasizing the well-known fact that individuals, the number of whose red cells is down as low as 1,000,000, may still continue to lead active lives. He roughly divides all of his cases according to the symptoms of which the patients complained on admission. One group embraces those who complain only of "shortness of breath and weakness on exertion." These gave the lowest count. A second group are those with nausea, vomiting, diarrhea, constipation, etc. In these the counts, on admission, ranged between 1,000,000 and 2,000,000. A last group consists of patients who have varied complaints and frequently symptoms referable to their nervous systems. This class usually gave the highest count. One of this last class, when re-admitted, complaining of numbness in the legs, had a count of 4,276,000 red cells. In the majority of

[1] American Journal of Medical Science, January, 1907.
[2] Berl. klin. Woch., xliv, Nr. 24.
[3] Johns Hopkins Hospital Bulletin, February, 1907.

his cases the low or falling number of red cells on admission was succeeded by an increase in the number of erythrocytes, which fell again, sometimes until death, but more often to the level at which it was on admission. In a few cases, however, the count rose steadily from the time of admission until death. In one case, on admission, the red cells were 1,228,000; nineteen days later they were 1,864,000; in eight days after the second count they were up to 2,144,000, and death occurred.

When he attempted to divide his cases according to counts made within forty-eight hours of death, he found the resulting groups to be much as they were on admission.

The reduction of hemoglobin was less than that of the red cells, and in 81 per cent. of all his cases the color index was at first 1 or over. Emerson is in accord with those authors who believe the high color index of pernicious anemia is due to the increased size of the cells and not to supersaturation.

Nucleated reds were present some time in 62 out of 74 cases. Normoblasts alone were noted in 11 cases; normoblasts, intermediates, and megaloblasts in 45; while megaloblasts and intermediates alone were present in but 6. In 44 per cent. of those cases which showed periods in which nucleated red cells were present for a considerable time, the number of red cells increased; in 56 per cent. their number was unchanged or decreased.

A leukopenia occurred on admission in 75 per cent. of this series of cases. Usually when the leukocytes were 10,000 or over it was found to be due to some intercurrent acute infection, although in several cases an even greater rise occurred as part of a blood crisis. In 18 out of 69 cases an absolute lymphocytosis was observed at some time. The mortality of these 18 cases was 61 per cent., hence Emerson inclines to the belief that the presence of an absolute lymphocytosis is an unfavorable sign. A relative lymphocytosis (mononuclear, non-granular cells, 30 per cent. or over) was found in 63 of the 69 cases. In 11 cases a true eosinophilia was present; 3 of this number proved fatal. A relative eosinophilia (over 4 per cent.) occurred in 15 cases. "Of these 15 cases, in 3 the reds were rising at the time the percentage of eosinophilia was high, in 6 they were not rising, in 5 they were falling, and 1 was doubtful. While a rise of eosinophile cells may mean increased marrow activity, it certainly does not mean that the prognosis is good." Myelocytes were present in 28 cases in from 0.2 per cent. to 0.8 per cent.

Emerson defines a blood crisis as a period during which 50 or more nucleated reds are found to every 1000 leukocytes. According to this arbitrary limit, blood crises occurred in 14 cases out of 70 observed. Blood crises may be divided into normoblastic and megaloblastic. Five of the 14 cases were normoblastic and 4 of these accompanied a rising count. The remaining 9 were megaloblastic, 7 of which were associated with a diminution of red cells and 2 with a slight gain. During these

megaloblastic crises there was the following variation in the cells: Normoblasts, 10 to 1400; intermediates, 460; megaloblasts, 36 to 240 per thousand leukocytes.

. There is a striking difference between the efficiency of normoblastic crises and that of megaloblastic. From the experimental standpoint Bunting[1] does not think that crises or showers of nucleated red blood cells can be regarded as evidence of regenerative marrow activity. He contends that since they are wanting in the recovery from hemorrhage or injury, and only immediately follow direct damage to the marrow by toxins, they are an index of the severity of the lesion. The greater the injury to the marrow, the more immature are the cells thrown out, hence the greater the number of megaloblasts found in the circulating blood.

It has long been recognized that the blood picture of pernicious anemia is of the highest importance in the diagnosis. When we accept toxemia as the most likely factor in the etiology of pernicious anemia, we must regard the blood picture, typical and pathognomonic as it is, not as the cause of the varied symptoms that arise, but rather as a part of the general symptom complex. This view is emphasized by Lichty[2] in his consideration of the more characteristic early symptoms of pernicious anemia. He regards as typical the blood picture characterized by a high color index, megaloblasts, megalocytes, poikilocytes, and leukopenia. This view corresponds essentially to that held by Cabot,[3] who states that when a patient suffering from pernicious anemia first consults a physician, the red corpuscles are reduced to 2,000,000 or less and the hemoglobin is reduced relatively less. Cabot insists that "the most important single point in the diagnosis of the disease" is that there is no pallor of the centre of the red cells and the cells "are strikingly oversized." He regards poikilocytosis, changes in staining reaction, and the presence of nucleated red cells as of less importance.

Other prominent and early symptoms mentioned by Lichty are loss of muscular power, dyspnea and cardiac oppression, a peculiar pallor, edema, submucous and subcutaneous hemorrhages, loss of appetite, achylia, diarrhea, or diarrhea alternating with constipation, a peculiar odor to the breath, eye symptoms, and certain nervous manifestations, as tabes dorsalis and peripheral neuritis. He considers achylia gastrica as a usually early symptom, having been found by him in 14 cases out of 20, in 9 of which it occurred very early. Six of his 20 cases had marked nervous symptoms, but in none were these early signs. In 4 there was peripheral neuritis and in 2 typical tabes dorsalis. The well-known cardiovascular symptoms of pernicious anemia were present in all of Lichty's cases at some time during their course. However, these were the least characteristic symptoms, and in only 5 cases did precordial

---

[1] Loc. cit.   [2] Journal of American Medical Association, June 20, 1907.
[3] Ibid., August 24, 1907.

distress and dyspnea appear before the diagnosis could be made certain by the blood picture. It is noteworthy that in the 20 cases studied by him, Lichty does not record paresthesia as among the early symptoms, although in several instances, other observers have found paresthesia, numbness, and tingling of the extremities complained of before other symptoms were-noticed. This author concludes that frequently certain premonitory symptoms of pernicious anemia precede the characteristic signs in the blood.

Freund[1] has studied the gastro-intestinal conditions found in pernicious anemia in a group of 53 cases. Of these he found that 54 per cent. complained of loss of appetite, 53 per cent. of bad taste in the mouth (largely due to bad teeth), 46 per cent. of nausea and vomiting, 54 per cent. of epigastric distress, 24 per cent. of diarrhea, and 10 per cent. of constipation. Most of these patients sought relief for gastric symptoms. He insists upon the importance of gastric analysis in the intelligent treatment of these cases. The analyses made by him gave the following results: Out of 25 cases examined for free hydrochloric acid, a small quantity was present in but one instance. Six out of 33 cases gave slight evidence of the presence of pepsin after a long period of time. In every case examined chymosin was absent. A marked excess of mucus was found in 80 per cent. of the cases. The results of the examination of the motor power of the stomach in these cases is interesting. In the 34 cases considered the motor power was increased in 24, 9 showed normal motility, and in but 1 case were there any signs of retention. The author found that some stomachs emptied themselves in twenty minutes.

Anomalous symptoms occurring either at the onset or in the course of pernicious anemia have been made the subject of investigation by Gulland,[2] who reports the following: Amaurosis, symptoms resembling peripheral neuritis, aphasia, kidney disease masking the pernicious anemia, acute Bright's disease, intercurrent pyemia, and long-continued anemia with acute terminal attack. It is because of the frequent occurrence of these atypical manifestations that he believes routine blood examinations offer the only consistent means of making the diagnosis.

Fortune[3] reports a severe case of epilepsy in which undoubted pernicious anemia developed. After the onset of the blood disease the epileptic seizures, although not entirely absent, decreased in number 33 per cent. Despite the fact that the number of paroxysms was less after the onset of the fever, Fortune suggests that the reduction was due to the altered coagulability of the blood. In epilepsy, this property is increased; in pernicious anemia, diminished.

Another case of pernicious anemia observed by the same author exhibited a striking pigmentation of the skin over the anterior aspect of

---

[1] Journal of the Michigan State Medical Society, February, 1907.
[2] British Medical Journal, January 12, 1907.　　　　[3] Ibid., October 19, 1907.

the trunk, with small spots distributed over the thighs. These areas of pigmentation were of a bronze color, and showed hemosiderin crystals in the subcutaneous tissue and corium, with numerous melanin granules in the basilar epidermal layers. This co-existence of iron-free granules · in the epidermis, and hemosiderin crystals in the connective tissue is at least suggestive.

Wilson[1] has noted *jaundice* as a late symptom in pernicious anemia in a woman, aged fifty-five years, who was apparently perfectly well until three months before death. Upon examination of her blood, it was found that the hemoglobin was 20 per cent., and the erythrocytes 832,000. Smears showed normoblasts, megaloblasts, poikilocytes, macrocytes, and microcytes. There were no evidences of intestinal intoxication. One month before her death, marked jaundice appeared; and shortly before the end, there was some bleeding from the gums, the lips, and the nose.

A curious condition of *recurrent retention of urine* has been reported by Cunningham.[2] His patient was a man, aged forty-seven years, with unmistakable symptoms and the typical blood count of pernicious anemia. He gave a history of retention of urine four years before. When he came under observation he had frequent urination, dribbling, etc., thirty-six ounces of residual urine, an hypertrophied prostate, and chronic cystitis. The Bottini operation was performed and the cystitis cured. For the next three months he had no urinary symptoms and the condition of his blood improved. Four months after the operation he had a return of the anemia, dribbling, difficult urination, and the residual urine. These urinary symptoms were again relieved, and along with this came improvement in the condition of the blood. Another attack occurred in six months. At the end of twenty-six months the final attack came, during which the patient died from uremia. The lowest blood count which he had during any of these attacks was hemoglobin, 10 per cent.; erythrocytes, 472,000; while the highest was hemoglobin, 45 per cent.; red cells, 3,500,000.

A case reported by Freund[3] is similar in many ways to that of Cunningham's. A man, aged fifty-six years, whose previous history showed that he had had difficulty in urination for some time, was admitted to the hospital complaining of numbness, stiffness of hands and feet, diarrhea, and loss of weight. At that time he urinated about every two hours. Upon examination, an enlarged prostate was found. His blood count was hemoglobin, 42 per cent.; red cells, 2,220,000; leukocytes, 6800. There was a relative lymphocytosis (40 per cent.). Smears showed many macrocytes, microcytes, and poikilocytes, but no nucleated red cells. Under treatment he improved, and his blood count showed hemoglobin,

[1] Pennsylvania Medical Journal, August, 1907.
[2] Annals of Surgery, February, 1907.
[3] Journal of American Medical Association, May 4, 1907.

56 per cent.; erythrocytes, 3,000,000; and numerous normoblasts and megaloblasts. Four days after this blood count was made the patient had retention of urine, which was relieved by catheterization. Immediately after the withdrawing of the urine his hemoglobin was 22 per cent. and reds 1,710,000. An acute exacerbation of anemia had occurred with the retention of the urine. The eosinophiles had risen to 15 per cent. Four days later he had a marked retention with a greatly distended bladder; 400 c.c. of urine were withdrawn. Immediately after this catheterization a second great drop occurred: hemoglobin 19 per cent., and the red cells only 740,000. The count remained fixed until the patient died a month later. These marked remissions in the blood count Freund attributes to the absorption of hemolysins, which have been found several times in urine of pernicious anemia, the actual retention being the result of the hypertrophied prostate.

TREATMENT. Herter, who considers that anaërobic bacteria in the intestinal tract have a prominent role in the etiology of pernicious anemia, demonstrated that oxygen is present in the intestines only as far down as the ileocecal valve; as a consequence, these anaërobia live below that level. He therefore suggests, as a rational treatment of the grave anemias of such enterogenous origin, the removal of the bacteria by therapeutic measures directed from the rectum. Hollis and Ditman[1] have tried this form of treatment in 2 cases with gratifying results. In both these cases the use of arsenic had been attended by very temporary improvement. They irrigated the colon and lower bowel with warm salt solution twice daily and continued each irrigation until the water returned clear. In both cases the indican which had been present diminished rapidly. In one case the hemoglobin rose in six weeks from 20 per cent. to 70 per cent., and the red blood corpuscles from 800,000 to 3,500,000. In the second case the hemoglobin increased from 25 per cent. to 82 per cent., and the red cells from 1,000,000 to 4,100,000 in two months. After leaving the hospital these colon irrigations were continued once daily. Some months after discharge both patients were well, and there had been no notable decrease in the blood count.

A more radical form of treatment has been carried out with apparent success by Houghton.[2] His patient, a man aged sixty-seven years, had all the symptoms and physical signs of a pernicious anemia. The hemoglobin was 45 per cent. (the reds not taken), the differential count showed a relative lymphocytosis and there were many normoblasts present. The urine, in addition to albumin and casts, showed an extraordinarily marked indican and skatol reaction. Under ordinary treatment by arsenic, iron, and intestinal lavage, the patient failed to improve; and at the end of a month he had a blood crisis of the megaloblastic type. Shortly after this a cecostomy was performed, and a second blood crisis occurred. Colonic irrigations were begun, given through the fistula

---

[1] Loc. cit.   [2] Journal of American Medical Association, June 29, 1907.

night and morning. Normal saline solution, sometimes with hydrogen peroxide and sometimes with permanganate of potash, was used. The patient was put on a nitrogen-free diet. About a year later he had gained considerable strength and weight, felt well, his hemoglobin was up to 85 per cent., all abnormal elements had disappeared from the blood, and the urine was almost free from indican or skatol.

A case of atypical anemia whose blood picture resembled pernicious anemia, but whose physical signs were those of splenomyelogenous leukemia, was treated by Frederich[1] with arsenic. The case showed no improvement. He then used nucleinic acid from yeast with the remarkable result that "the patient improved rapidly, and was discharged completely recovered." Although this favorable result may have occurred not because of but as a coincidence with the use of nucleinic acid, as Frederich quite properly points out, it is highly suggestive, since neither pernicious anemia nor leukemia tend toward recovery.

Transfusion of blood as a therapeutic measure in grave anemias would seem, in some cases at least, to be highly efficacious from the report of Morawitz[2] who treated three cases by this method. All 3 were progressively growing worse under treatment by arsenic and other usual measures. A single intravenous injection of from 150 to 200 c.c. of defibrinated blood from another person was then made. In three days marked improvement occurred, the hemoglobin rose rapidly, and recovery followed. In a boy, aged fifteen years, who had a severe anemia with some leukemic indications, the hemoglobin went from 30 per cent. to 100 per cent. in less than two months. In a second case of grave anemia following parturition without hemorrhage the hemoglobin increased from 20 per cent. to 50 per cent. in six weeks. The third case was that of a woman, aged forty-seven years, whose blood count was hemoglobin, 25 per cent.; reds, 1,230,000; and whites, 3300. A month after the transfusion the hemoglobin was up to 50 per cent.; reds, 2,600,000; and whites, 6000; at the end of three months her blood picture was normal.

The treatment of pernicious anemia by the *x-rays* is unalterably opposed by Mosse,[3] who believes its use in this condition is never indicated. In support of this opinion he recalls the results of a former research undertaken by Milchner and himself, in which they proved the resistance of the erythroblastic parts of the bone marrow to the Röntgen rays. He further cites the more recent work of Aubertin and Beaujard, who found that strong rays cause an increase of the number of megaloblasts, which compose part of the erythroblastic portion of the marrow already injured by the disease. Mosse contends that such an increase can only have an unfavorable influence instead of the desired good results.

A possible antagonism between cholesterin and the toxolecithids and

[1] Journal of American Medical Association, June 29, 1907.
[2] Münch. med. Woch., liv, Nr. 16.   [3] Loc. cit.

toxolipoids is suggested by the experiments of Morgenroth and Reicher.[1] They believe the use of cholesterin is at least tentatively indicated in all anemias of parasitic origin and in pernicious anemia of unknown origin. They claim that it is readily absorbed and harmless. It is an interesting fact that by cholesterin injections they were able to prevent the occurrence of the hitherto inevitable anemia which follows the intravenous injection of lecithid from cobra venom.

For thirteen years Hirschfeld[2] had under his observation a typical case of pernicious anemia that was kept in good condition by the periodic use of Fowler's solution. This experience has led him to believe that the systematic administration of arsenic will render the prognosis of pernicious anemia better than it can otherwise be.

Hunter[3] has also outlined the treatment to be aimed at in those forms of pernicious anemia in which the most important etiological factor is oral sepsis. He says that in addition to general tonic and dietetic measures directed toward improvement of the blood, the greatest efforts should be made to remove the source of constant infection that exists in the mouth, stomach, and intestines. He advises careful local antiseptic measures in the case of the mouth, and intestinal antiseptics for the other portions of the digestive tract. In addition, he urges special local antiseptic treatment of the glossitis when it exists, supplemented by increasing the antitoxic power of the blood by serum therapy.

Chlorosis. It has been asserted that this disease, in its typical form, is gradually becoming rarer, and is now less often met with than pernicious anemia. Cabot[4] calls attention to this fact, and states that there is no such thing as chlorosis in boys, and that when it is found in women past thirty years old it is a relapse or a recurrence of an earlier chlorosis. The disease is typically found in women between the ages of seventeen and twenty-five.

Attempts to lessen the obscurity surrounding the etiology of this form of primary anemia have been meagre of late, the chief interest of investigators centring about pernicious anemia and grave secondary anemias. Dodds[5] is impressed by the frequency with which a considerable degree of kidney change is found in cases of chlorosis. In the cases of four young girls between the ages of eleven and fifteen years he has observed albumin and casts in the urine, accompanying the blood picture of chlorosis. The amount of blood lost daily through the kidneys, he believes, has some influence in the production of the anemia.

The anemia so frequently found associated with tuberculosis, according to Shurly,[6] is of the true chlorotic type, that is, an anemia character-

---

[1] Berl. klin. Woch., xliv, Nr. 38. [2] Therapie der Gegenwart, xlviii, Nr. 8.
[3] Loc. cit. [4] Loc. cit.
[5] Central States Medical Monitor, June, 1907.
[6] Journal of Michigan State Medical Society, March 1, 1907.

ized by a diminution of the hemoglobin disproportionate to the reduction of the number of red cells.

Steinberg[1] holds that chlorosis is essentially a gynecological affection referable to the ovaries.

It is unnecessary to do more here than to make mention of the often described classic blood picture of chlorosis, in regard to which there exists such unanimity among writers. Cabot[2] states that on an average the hemoglobin is reduced to 40 per cent., while the red cells rarely fall below 4,000,000. The discrepancy between the number of erythrocytes and the reduction of hemoglobin gives rise to the phenomenon known as the low color index, which indicates that each red cell contains only about one-half the normal amount of hemoglobin. The central pallor and generally diminished size of the red cells, as seen on coverslip preparations, emphasize this condition. In 50 cases of chlorosis, Warfwinge[3] found a reduction of the hemoglobin to 15 per cent., while the red cell count varied but little from the normal. This characteristic disproportion between the number of red cells and the amount of hemoglobin, he regards as presumptive evidence that chlorosis is a "specific essential affection," due in all probability to some toxin, which, by an inhibiting action, prevents the red cells from taking up substances needed for the production of hemoglobin.

TREATMENT OF CHLOROSIS. The more recent literature on chlorosis deals largely with the treatment of the disease. Iron, now as formerly, is the drug upon which the majority of authors place the most dependence. In every instance attention is called to the importance of administering drugs with the greatest care, so that the digestion shall not be impaired. In order to prevent gastro-intestinal disturbances, Shurly[4] and Schirokaner[5] recommend the use of iron hypodermically, or even intravenously. This mode of administration assures rapid action of the drug.

Schirokaner regards gastric atony as frequently associated with these anemias, and recommends that the use of iron be supplemented with hot baths, electric light baths, and four light but nourishing meals a day.

Sittman[6] uses iron in the form of Blaudi mass, liq. ferri album., and sometimes iron combined with arsenic and quinine; and claims excellent results. Warfwinge[7] cautions against the use of iron in any compound which does not give the iron reaction by ordinary tests. He believes that large doses of iron are required, as a considerable proportion of it is unabsorbed; and that the treatment must continue for at least six weeks, part of which time the patient should be kept in bed.

Rosin[8] claims that hot baths have a powerful stimulating action on

---

[1] Berl. klin. Woch., xliv, Nr. 15.   [2] Loc. cit.

[3] Nordiskt med. Archiv, xl, Nr. 1.   [4] Loc. cit.

[5] Deutsch. med. Woch., xxxiii, Nr. 35.   [6] Deutsch. med. Woch., xxxii, Nr. 52.

[7] Loc. cit.   [8] Therapie der Gegenwart, lvii, Nr. 5.

the bone marrow. He treats his cases of chlorosis by a hot bath with water constantly at 40° C. (104° F.), given about 11 A.M., for ten to twenty minutes. This is followed by a cold douche, a rub down, and an hour of rest. He orders three of these baths a week, and in four to six weeks of such treatment, he says, there is generally complete cure.

Wandel,[1] on the other hand, says that electric light baths, followed by cold .douches, and other hydrotherapeutic measures, are useless in chlorosis unless combined with the administration of iron. When used in conjunction with iron, they promote assimilation of the drug and assist in transforming it into hemoglobin.

The use of hot mud baths in this disease is strongly recommended by Steinberg,[2] who has had excellent results from them. The alleged specific action of hot mud baths on the ovaries is held responsible for the beneficial effect of these baths.

Nutritive Anemia. The theory advanced by Rollin that, with the deficient secretion of gastric juice, especially with a lack of hydrochloric acid, there is anemia characterized by decreased diameter of the red cells and the appearance of smaller forms in the blood, has been mentioned in an earlier number of PROGRESSIVE MEDICINE (June, 1907). More recently, Rollin[3] asserts that, by increasing the amount of hyd.ochloric acid in the stomach, these anemias, which he styles nutritive, can be favorably influenced. Further, he states, so definite and constant is the relationship existing between the size and condition of the erythrocytes, and the degree of gastric acidity, that, from a general physical examination and an examination of fresh blood smears, we may arrive at a reasonably accurate idea of the proportion of hydrochloric acid in the gastric secretion.

Secondary Anemias. When discussing pernicious anemia, I called attention to the undoubted infectious origin of certain grave anemias of the pernicious type. Fortunately, by far the most frequent result of acute infections on the blood is the production of a secondary anemia, which tends to improve rapidly as convalescence takes place. In an article appearing in *La Semaine Médicale*, xxvi, No. 51 (the author's name not given), this latter group of anemias is claimed to be due to the hemolytic action of the bacteria, since the cells were found more or less fragmented within the macrophytes. In certain infections the bone marrow is stimulated to the production of red cells as well as white, with the result that red cells are formed faster than they are destroyed by the bacterial invasion. For this reason a pernicious anemia does not occur. The diagnosis of these secondary anemias from pernicious anemias, which they may closely simulate, depends primarily, according to this paper, upon finding the causative organism in the blood culture.

[1] Deutsch. Archiv f. klin. Med., xc, Nrs. 1 und 2.
[2] Loc. cit.   [3] Berl. klin. Woch., xliv, Nr. 36.

Cabot,[1] discussing the diagnosis of anemias, refers to anemias of "the small cell type" as those anemias which are secondary to hemorrhage, malaria, nephritis, intestinal parasites, and other diseases which induce blood destruction. He says that in the diagnosis of anemias of this type it is especially essential to consider all the facts in the case, since the etiological factors and the results of general physical diagnosis are as important as the blood findings.

False anemias is the term applied by Strauss[2] to those cases in which patients look anemic, but examination reveals the blood to be apparently normal. He considers this anemic aspect to be due to either lessened transparency of the skin or lessened filling of the superficial vessels, usually the result of spasmodic contraction of the vessels. He has observed such false anemias in lead poisoning, kidney disease, Raynaud's disease, incipient tuberculosis, and in enteroptosis and diseases of the gastro-intestinal tract. The vascular spasm producing the anemic appearance is generally of nervous origin, and manifests a weakness in the function, and possibly in the structure of the organ involved.

Chapman[3] has found that an increase in the number of lymphocytes in an anemia associated with a tumor suggests that the tumor is a sarcoma; and that the anemia resulting from sarcoma usually shows a greater diminution in the hemoglobin percentage than does that found in carcinoma. The blood in malignant disease may show a leukocytosis; but, according to this author, it never shows the increase in fibrin or coagulability, together with an increase in the blood platelets which occurs in inflammatory conditions. This difference in the blood, he believes, is of value in differentiating between the presence of pus and of malignant disease.

Ring bodies, which have been described in pernicious anemia, have been found recently by Schleip[4] in several cases of severe secondary anemia. He is unable, however, to give any explanation for their presence, other than that which has already been advanced by Cabot.

TREATMENT. Meltzer[5] believes that the work of Crile on the problem of transfusion of blood has been the most distinct recent advance in the treatment of anemia, especially of that form which follows hemorrhage. Crile has modified the technique of Carrel, and has devised a method of direct transfusion by which blood from one animal flows directly into the vessels of another. He has invariably obtained brilliant results by the experimental employment of this method. When he used it in a grave case of posthemorrhagic anemia in a human being, the outcome was none the less gratifying. So far, his clinical results would seem to warrant the statement made by Crile himself that the direct transfusion

[1] Loc. cit.   [2] Berl. klin. Woch., xliv, Nr. 19.
[3] Central States Medical Monitor, July, 1907.
[4] Deutsch. Archiv f. klin. Med., xci, Nrs. 5 und 6.
[5] Journal American Medical Association, August 24, 1907.

is a positive cure in all acute hemorrhagic anemias, and that the pathological anemias are invariably benefited.

Meltzer is positive as to the efficiency of ingested inorganic iron in the treatment of anemias. He believes that all ingested iron, no matter what its form, goes first to the liver, the bone marrow, and especially the spleen, where it is stored up to be converted, as the needs of the animal economy demand, into the organic compounds. Ingested iron, therefore, is never directly utilized for the building up of hemoglobin; but the iron requirements of the blood are met by these reserve deposits of intermediary organic compounds.

Proskauer[1] recommends the use of Fowler's solution in anemia, and cites 8 cases of various forms of anemia which were greatly benefited by its use. His best results were obtained in chlorosis. In 1 case the hemoglobin went from 55 per cent. to 68 per cent., and the red cells from 4,075,000 to 4,375,000 in twenty-four days. In another chlorotic patient, within twenty-one days, the hemoglobin had advanced from 65 per cent. to 90 per cent., and the erythrocytes from 3,700,000 to 4,775,000.

Pope[2] holds with Gardinghi that the absorption of iron from the liver is brought about by the presence of light; hence he considers hygienic and dietetic measures of prime importance in the treatment of secondary anemias, and places but small reliance in the use of drugs. "Hydrotherapy," he says, "is more nearly a panacea for anemia than any other measure known." The free use of water internally, he believes, raises blood pressure, deepens respiration, increases the interchange of oxygen and carbon dioxide, and directly stimulates and increases secretion, absorption, and excretion. Tonic hydrotherapy, he claims, makes the blood more fluid, increases its alkalinity, and raises the number of red cells. In addition, he keeps the bowels well opened and corrects intestinal putrefaction, so frequently found, by a diet of milk which has first been sterilized and then soured by means of the Bulgarian lactic acid bacillus. As an adjunct to the treatment, he recommends as very valuable fresh air, sunshine, deep inhalations, and massage.

Infantile Anemias. A careful report of 9 cases of *anemia infantum pseudoleukemia* has been given by Koplik.[3] All of his cases occurred in children between the ages of eleven and twenty months. The lowest hemoglobin estimation was 25 per cent.; the highest 65 per cent. This latter case had also the highest leukocyte count of any of the 9 cases, the leukocytes being 96,000. Three of these 9 cases terminated fatally.

A severe case of *splenic infantile anemia* is reported by Wolff.[4] This case occurred in a child one year old, in whom the hemoglobin was 40 per cent., the reds only 467,000, and the leukocytes 37,800. The

[1] Berl. klin. Woch., xliv, Nr. 34.
[2] New York Medical Journal, November 2, 1907.
[3] Archives of Pediatrics, March, 1907.   [4] Berliner klin.,Woch., liii, Nr. 49.

cachexia was marked, and the spleen greatly enlarged. The spleen after removal weighed one pound, and measured 19 x 11 x 3 cm.; the entire weight of the child was only fourteen pounds. The removal of the spleen was accomplished under chloroform anesthesia by a bloodless operation lasting forty minutes. Wolff contends that this affection is the result of some primary disturbance in the spleen. He is led to take this view by the fact that ten days after the splenectomy in this case the child had gained two pounds in weight, the red cells had increased to over 4,000,000, and from then on the improvement was progressive.

Chronic Anemia with Jaundice. This condition has been observed by Benjamin and Sluka,[1] who report 3 interesting cases of anemia with marked jaundice occurring in the same family. One of the cases was in the grandfather, eighty-one years old, in whom the jaundice was most marked. Another case was in his son, aged thirty-six years, who had less jaundice, but an enormously enlarged spleen; and the third case was in this man's daughter, who, at nine years of age, had less jaundice than either her father or her grandfather, but in whom there was enlargement of both liver and spleen.

Polycythemia with Enlargement of the Spleen. Although polycythemia with enlargement of the spleen, so-called Vaquez's disease, continues to excite the interest of clinicians, one can scarcely say that any noteworthy contributions upon this subject have been made during the past year.

Senator[2] has studied carefully two cases of polycythemia with splenic enlargement, and has investigated the metabolism, especially that of the gases and the blood. The results of his observations have led him to believe that there is evidence in favor of increased red cell production from hyperfunctionating of the bone marrow. He thinks that an explanation of this affection might be arrived at if it could be determined that the enlargement of the spleen occurs before the polycythemia.

In his report of 2 cases, Saundley[3] expresses the belief that influenza and other acute infections, through their toxins, produce this condition of splenomegalic polycythemia. His conception of the affection is that a cerebrospinal neurasthenia results, giving rise to vasomotor spasm, with capillary and venous engorgement, visceral congestion—especially of the liver and the spleen—associated with muscular weakness, loss of knee-jerks, and various symptoms of mental impairment.

Anders[4] has given a complete review of the cases reported in the literature, which, with 3 cases of his own, make a total of 53. From the study of his own cases he concludes that defective venous tonus is a major factor in the pathogenesis of chronic polycythemia.

Aldrich and Crummer[5] report a typical case of chronic polycythemia

[1] Berliner klin. Woch., liv, Nr. 34.   [2] Zeit. f. klin. Med., lx, Nrs. 5 und 6.
[3] British Medical Journal, May, 1907.
[4] Journal of American Medical Association, July 20, 1907.
[5] Ibid., April 6, 1907.

occurring in a woman aged fifty-three years. Earlier in life she had been exposed to tuberculosis, but had never had any evidence of that disease, and on examination showed none. For eight years she had noticed a striking redness of her face, and five years after this redness appeared she observed a progressive enlargement of the left side of her abdomen. When she came under observation the exposed portions of her skin were dusky red and there was a greatly enlarged spleen. Her blood count showed the hemoglobin to be 102 per cent., the red cells 7,700,000, and the leukocytes 4700. Under x-ray treatment her blood count fell and the spleen diminished markedly.

Pethybridge[1] also reports a case with enlarged liver, splenic tumor, and a blood count in which the hemoglogin was 140 per cent., reds 8,320,000, and leukocytes 12,000. His patient was a man, aged sixty-seven years, which is the oldest hitherto reported case of this disease.

TREATMENT. Hirschfeld,[2] in discussing the treatment of polycythemia, recommends the use of iodides, on the ground that they may be expected to do good symptomatically at least, since it has been shown that in polycythemia there is an increase of the viscosity of the blood, which causes many of the symptoms, and the iodides are well recognized as being able to reduce this viscosity. He states that treatment by arsenic and iron-free food has been of no avail, that splenectomy has failed to affect the blood condition, and that repeated venesections have served only temporarily to lessen the plethora. This last statement is confirmed by the experience of Senator,[3] who in his 2 cases found that spontaneous hemorrhages or venesections afforded only temporary relief.

Banti's Disease and Splenic Anemia. Einhorn[4] adheres to the original description of Banti's disease, and divides it into three stages, i. e., the pre-ascitic, the intermediate, and the ascitic stages. During the first stage, he says, the patients complain of weakness and dyspnea, and sometimes epistaxis. When there is high grade anemia, some edema and intermittent fever may also occur. Anemia and enlargement of the spleen are the important conditions of this first stage, which extends from one to four and one-half years. The second stage is short, lasting only about one month, and is characterized by a decrease in the amount of urine, which was at first unaffected. Along with this diminished elimination, diarrhea and often hemorrhoids occur. Steadily but slowly the third stage appears and advances. Ascites develops painlessly. This ascites is not absorbed, and recurs after tapping. The amount of urine is still further cut down, but now contains no bile, albumin, or sugar, although urobilin is present in excess. There is progressive weakness of the patient from then on until the end. This final stage lasts on an average about six weeks.

[1] British Medical Journal, July 6, 1907.
[2] Therapie der Gegenwart, xlvii, Nr. 8.
[3] Loc. cit.   [4] Archiv f. Verdauungs Krank., xii, Nr. 27.

Einhorn believes that the spleen is intimately connected with the etiology of this disease, since good results often follow splenectomy. In order to accomplish the most good, he urges that enucleation of the spleen be practised early in the first and second stages before ascites appears. He questions whether cases such as above described are true cases of Banti's disease when they are associated with marked liver cirrhosis. In this connection he refers to 18 cases of undoubted Banti's disease seen by him. These have already been considered in detail in PROGRESSIVE MEDICINE for June, 1907.

Einhorn again classifies these 18 cases into three groups, namely:

1. True form: splenomegalia, anemia, liver cirrhosis, and ascites.

2. Hemorrhagic form: profuse gastric and intestinal bleeding, in addition to the above symptoms of group 1.

3. Splenomegalia, enlargement of the liver, anemia, and (in the majority of this group) severe gastric symptoms.

He has found gastric ulcer a frequent accompaniment of the cases in group 2.

That splenectomy does yield encouraging results is asserted by Thiel,[1] who reports the cure by this procedure of a well-advanced case of primary splenomegalia with anemia, in which there was not only ascites, but also icterus and hemorrhages from some of the mucous membranes.

An unusual case simulating Banti's disease in many ways, the diagnosis of which was decidedly doubtful, is reported by Edens.[2] In this case the liver was not palpable and the spleen only slightly enlarged; besides a general edema, there was hydrothorax and ascites. The hemoglobin was only 15 per cent., the red cells 2,680,000, and the leukocytes 3,620, 79 per cent. of which were polymorphonuclear neutrophiles. The interesting fact about this case is that at autopsy thrombi were found in both splenic and portal veins.

Jamieson[3] has reported two typical cases of splenic anemia with moderate enlargement of the spleen and cirrhosis of the liver.

In considering the "family form" of anemia with splenic enlargement, Cowan[4] gives an account of two cases which present some uncommon features. The symptoms in both these cases had existed for several years; in one for twelve and in the other for fourteen. Both showed marked anemia, yellowish coloration of the skin, some enlargement of the liver, and (most striking of all) decided underdevelopment, causing the patients to appear much younger than they really were. In one case there was extreme splenic enlargement, while in the other it was only moderate. Except for a few small retinal hemorrhages, that at one time were found in one case, no hemorrhagic tendency was noted.

---

[1] Deutsch. Zeit. f. Chir., lxxxiv, Nrs. 4 to 6.
[2] Mitteilung. a. d. Grenzgebieten d. Med. und Chirurgie, xviii, Nr. 1.
[3] Australian Medical Gazette, September, 1907.
[4] Quarterly Journal of Medicine, October, 1907.

DeCourey[1] takes up the various diseases in which splenic enlargement with anemia occurs. In addition to Hodgkin's disease, pernicious anemia, Banti's disease, splenic anemia, and leukemia, he considers the acute infections, like typhoid, in which a splenic tumor and secondary anemia occur. Although he describes the blood changes, he fails to show any relation between the splenic enlargement and the blood picture.

A curious condition of splenomegalia with remittent fever, anemia, and emaciation occurs in the tropics, and resembles the disease known in India as *kala azar*. Such a case has been observed by H. W. Smith[2] in the Philippines, where it is somewhat common. No light has as yet been thrown on the etiology of this disease, and in Smith's case repeated Widal reactions and blood cultures were negative, and careful searches for parasites proved fruitless.

Leukemia. A survey of the literature for the past year fails to discover any decided addition to our knowledge of that interesting group of blood diseases, the leukemias; nor has there been any decided effort to alter the nomenclature, which is held by some to be no longer adequate for the complexity of conditions that are found.

ACUTE LEUKEMIA. The interest shown of late in the acute forms of leukemia is continued, and by far the largest number of cases reported fall under this head. Furthermore, it is apparent that the term acute leukemia can no longer be restricted to acute lymphatic leukemia, since several observers note the occurrence of acute leukemia of the myeloid type.

An interesting observation has been made by White and Pröscher,[3] who, in conjunction with their work on Hodgkin's disease, have investigated a case of acute lymphatic leukemia, bacteriologically. In smears made from fluid aspirated from the enlarged lymph glands, and in the exudate of extirpated glands, as well as within the tissue of the glands themselves, they have been able to demonstrate numbers of spirochetes. These spirochetes showed poor motility, and their bodies were slender and pointed at both ends.

A case of lymphatic leukemia associated with streptococcus sepsis has been described by W. Erb.[4] However, he did not attach any etiological significance to the septic infection, but considered it rather as secondary to the leukemia.

On the other hand, Stirniman[5] reports a case similar to two others which he collected from the literature. A child, three years old, developed symptoms strongly suggesting leukemia, although liver and spleen were not enlarged, and the only increase in lymphoid tissue occurred in

[1] Dublin Journal of Medical Science, July, 1907.
[2] United States Naval Medical Bulletin, April, 1907.
[3] Journal of American Medical Association, September 28, 1907.
[4] Deutsch. med. Woch., xxxiii, Nr. 21.   [5] Jahrb. f. Kinderh., lxv, Nr. 5.

the tonsils. These were removed two months after the onset of the first symptoms. Nine days after the operation the child died from a severe acute leukemia. In this case it is not impossible that septic infection had some part in the production of the acute leukemia.

In a case of acute lymphatic leukemia observed by Scatliff and Habhouse,[1] an extraordinary variability of the symptoms occurred. Sometimes this case resembled typhoid fever, at another time scurvy, and yet again acute septicemia; but throughout its course it never gave a clinical picture that was consistent with any of these conditions.

Bailey[2] has collected the data of 5 cases of acute lymphatic leukemia admitted to St. George's Hospital during ten years. In all of these cases there was great similarity in the symptoms and a fatal termination occurred in all of them within four and one-half months of the onset.

Tange[3] noted acute leukemia of the lymphatic variety in a little girl aged four and one-half years. Her blood count showed hemoglobin of only 6 per cent., red cells 420,000, and leukocytes 15,000. The lymphocytes were 96.4 per cent. The disease terminated fatally in six weeks.

Emerson[4] has reported 3 interesting cases of acute leukemia, each of which represents a distinct type. His first case was one of acute lymphatic leukemia without enlargement of lymph glands or spleen, but with localized bone marrow involvement. On admission to the hospital the leukocytes were 428,000, of which 96 per cent. were large mononuclears. At autopsy, the ribs appeared free from bone marrow, the marrow from the centre of the femur was fatty, and that of the vertebræ was soft, opaque, and grayish pink in color.

The next he classes as one of probable acute myelogenous leukemia. This patient, admitted on the eleventh day of the disease, died twelve days later, after running a decidedly typhoidal course, with abdominal pain and continuous fever always above 100.5° F. There was never any glandular enlargement, but five days after admission the liver and spleen became enlarged and palpable. On admission, the leukocytes were 12,000, a little less than a week later they were 64,000, 41 per cent. of which were polymorphonuclear, 44 per cent. large mononuclear, and 10 per cent. small lymphocytes. Just before death the leukocytes were 184,000. At autopsy, the bone marrow was found soft and reddish gray.

Emerson believes his third case to be one of "aplastic leukemia." This one also ran an acute course, with death in less than six weeks from the onset. The patient was extraordinarily pale, and had a generalized enlargement of the superficial glands, together with an enlarged liver and spleen. Acute leukemia was suspected at first until a leukopenia was found. On admission the leukocytes were 3800, of which large and

[1] Lancet, June 22, 1907.   [2] Lancet, December 15, 1907.

[3] Australian Medical Gazette, March 20, 1907.

[4] Bulletin Johns Hopkins Hospital, March, 1907.

small mononuclears together made up 82 per cent. The leukopenia became more marked, and the leukocytes numbered only 1920 before death. As the number of leukocytes fell, the liver and spleen decreased in size. Unfortunately, this case did not come to autopsy.

Seemingly undoubted acute myeloid leukemia was found by Ziegler and Jochmann[1] in a fifteen-year-old boy. The leukemic manifestations followed quickly upon the onset of staphylococcic pericarditis, preceded by tonsillitis. The blood was loaded with myelocytes, and the microscopic examination of the spleen and bone marrow further confirmed the clinical diagnosis, but in the lymph glands and digestive tract no evidence of myeloid deposits could be discovered.

Sabel[2] has met with a confusing case in which the blood picture was that of acute lymphatic leukemia. Clinically there were no important symptoms, and the spleen and glands were not palpable until two days before death, when the spleen became palpable and tender. On the following day there was soreness in the thighs and tenderness over the tibia and femur. In spite of the blood picture, Sabel considers the clinical evidences in this case as strongly suggesting an acute leukemia of myelogenous origin.

CHRONIC LEUKEMIA. The blood formation in leukemia has been studied by Meyer and Heineke.[3] They believe their observations demonstrate that the blood changes in leukemia are the result, not of perverted blood formation, but of reaction of the blood-forming organs to some toxic influence. This response, as it were, of the blood-forming organs differs according to whether we are dealing with a myeloid or a lymphatic leukemia. They are distinctly different processes: in myelogenous leukemia, new formation of myeloid tissue occurs, not infrequently even the conversion of lymphoid tissue itself; whereas, in lymphatic leukemia there results an increase of lymphoid elements throughout the body. These authors have never observed a lymphatic change in myeloid tissue. However, they have produced myeloid changes in the liver and spleen of rabbits from injury to the blood. They conclude that at one time or another leukemias are the result of simultaneous leukopoesis and erythropoesis.

Capp and Smith[4] have made some interesting observations on the leukolytic action of leukemic serum. They found that normal human serum when injected into animals caused, in twenty-four hours, a slight leukocytosis; while the injection of leukemic serum was followed by a more decided increase in the leukocytes; but when serum from leukemia cases that had received x-ray treatment was injected, within a day there was a distinct fall in the number of leukocytes. The extent of this drop in the number of leukocytes was in direct proportion to the degree of

---

[1] Deutsch. med. Woch., xxxiii, Nr. 19.
[2] New York Medical Journal, June 15, 1907.   [3] Loc. cit.
[4] Journal of Experimental Medicine, January, 1907.

improvement derived by the leukemic patient from x-ray treatment. Hence they seem warranted in concluding that the amount of leukolytic substance present in the blood of leukemia varies directly with the degree of clinical improvement noted in the case. This hemolytic action appears somewhat selective, since the blood of injected animals indicated that the mononuclear cells were influenced more than the polynuclear.

These experimenters, by studying in hanging-drop preparations the effects of leukemic serum on normal human blood and other leukemic blood, found that:

1. Leukemic serum from a patient that had had no x-ray treatment had no leukolytic action on normal or other leukemic blood, and had no agglutinating action on the erythrocytes of such blood.

2. The serum from leukemia cases that had received x-ray treatment had a marked leukolytic action on normal human blood and leukemic blood, this effect being in direct proportion to the symptomatic improvement of the patient.

3. This leukolytic action showed a decided preference for the mononuclear cells and the myelocytes.

4. The serum of leukemia patients treated by x-rays also agglutinated the erythrocytes of normal and other leukemic blood.

Finally, they injected a strong leukolytic serum, obtained from a case of lymphatic leukemia under x-ray treatment into another individual with lymphatic leukemia but not under such treatment, with the result that a decided and rapid fall in the number of leukocytes occurred, the mononuclear cells being chiefly affected.

Tedeschi,[1] who several years ago published his hemolytic tests in cancer and leukemia, has arrived at the conclusion that the constancy with which he has obtained positive results indicates the practical importance of the hemolytic test in the diagnosis of malignant disease and leukemia.

The blood findings in leukemia complicated by tuberculosis are at times very confusing, as pointed out by Guyot.[2] He concludes that when tuberculosis and leukemia co-exist the leukocytes remain normal during the initial stage of the tuberculosis. During the early period of fever the leukocytes increase, but as the tuberculosis advances, the eosinophiles, which had been increased, diminish in number, and the lymphocytes, at first decreased, become greatly increased.

A case of chronic leukemia extending over two years and complicated with pulmonary tuberculosis, is reported by Cadbury and Cummins.[3] In this case the tuberculosis appeared in no way to affect the course of the leukemia.

The frequency with which the chronic forms of leukemia are today

---

[1] Gazetta degli Ospedali, xxviii, Nos. 3 to 9.   [2] Ibid., xxvii, No. 195.
[2] University of Pennsylvania Medical Bulletin, October, 1907.

recognized causes only the more unusual cases to be reported. Among those reported recently may be mentioned the case of Flesch and Schossberger.[1] It was a child aged seven weeks, in which leukemic blood changes existed along with congenital syphilis and sepsis. The white count was 51,500, and the differential showed neutrophilic polymorphonuclears 54 per cent.; myelocytes, 9 per cent.; eosinophiles, 7 per cent.; and eosinophilic myelocytes, 1 per cent. All the glands were enlarged, and the spleen was three times its normal size. Soon after admission the child died. The autopsy showed pyemia, congenital syphilis, and poorly marked leukemic changes. Streptococci were found in the blood.

It is usually stated that the duration of a case of chronic leukemia is rarely over five years. Shafland,[2] however, reports a typical case of splenomedullary leukemia which was of over twelve years' duration.

Parker[3] has observed a case of splenomedullary leukemia following an attack of gout and associated with albuminuria. In this case, x-rays did a great deal to improve the blood findings and to diminish the size of the spleen.

The cutaneous manifestations of lymphatic leukemia have been considered by Isler,[4] who states that they may appear as eczema, or large or small tumors (generally in the face), causing little or no disturbance. There may be a tendency for cutaneous phenomena in this disease to undergo transformation into fungoid mycosis and sarcomatosis of the skin.

Schultze[5] believes that leukemia may be frequently overlooked because certain of the objective symptoms, as pallor, etc., are often less exaggerated than is generally supposed. During the early and the middle stages of leukemia, he says, a good color of the skin and mucous membranes may be observed, even when there is pronounced splenic enlargement. He adds that the hemoglobin may stay almost normal, while the blood in other respects is typically leukemic.

When one considers the uniform failure that attended all efforts in the treatment of leukemia until, lately, the use of the x-rays has produced results which are hopeful, if not for the actual cure of leukemia, at least for its arrest, it becomes all the more remarkable that throughout the literature of the past year there should be such a scarcity of contributions dealing with the x-ray treatment of leukemia.

However, this phase of the subject is considered by Maragliano.[6] He found, in a typical case of splenomyelogenous leukemia with enlarged glands, that those glands, far removed from the area of the body exposed

[1] Deutsch. med. Woch., xxxiii, Nr. 27.
[2] British Medical Journal, October 19, 1907.
[3] Ibid., May 18, 1907.
[4] Centralbl. f. d. Grenzg. der Med. u. Chir., ix, 17 to 23.
[5] Therapie der Gegenwart, xlviii, Nr. 1.
[6] Gazetta degli Ospedali, xxvii, 126 to 132.

to the x-rays, promptly subsided. When exposures were made over the spleen and cervical glands, and not over the bones, the inguinal glands diminished in size parallel with the diminution noted in the exposed cervical glands. The glandular retrogression preceded the effect of the x-rays on the blood. The improvement in this case had persisted for a year and a half when this paper was written. He is of the opinion that a more radical beneficial influence on leukemia would result if larger areas were exposed to the x-rays. He especially recommends exposing the neck, a region rich in glands, and the liver, a highly vascular area, in addition to the spleen. Heretofore the fear of producing skin injury has prevented the exposure of large areas. In order to eliminate this danger, he urges the filtering of the rays through four layers of diachylon. This shuts out from the skin the harmful non-penetrating rays, but allows the really curative rays to penetrate, thus making possible a more extensive though less injurious use of the rays, which have a truly therapeutic value.

On the other hand, Clarke[1] has observed a case of lymphadenoma in a child, in whom, after each application of the Röntgen rays, there was great diminution in the size of the glands, but in whom the enlargement returned after the x-ray treatment had been discontinued. This child died of an intercurrent pneumonia. The autopsy demonstrated that, although the x-ray treatment had diminished the size of the glands, the essential changes within them, which in this case were the presence of endothelial and giant cells, were in no way affected. The x-rays had not prevented in the slightest degree the spread of the disease to the internal organs and the development of nodules in the liver and spleen.

LEUKEMIA IN CHILDREN. Benjamin and Sluka[2] have collected from the literature and their own experience 160 cases of leukemia in children. Sixty of the number they have reported in detail. That the acute lymphatic form predominates in children may be seen from the fact that they found 35 cases of acute lymphatic leukemia, 2 of the acute myeloid form, and only 8 of the chronic myeloid form. In infants they report 5 cases of lymphatic and 5 of myeloid leukemia. In the acute lymphatic form, the average age of the patient was seven years; in the myeloid form the age was usually greater, averaging ten years. The course of the lymphoid form was invariably rapid, and in 5 cases of acute lymphatic leukemia the use of Röntgen rays failed to prolong the course of the disease. In spite of the fact that after a few days of this treatment there was a drop in the number of leukocytes and a shrinkage in the size of the spleen, the lymph glands, and the liver, the affection went on to the regular fatal termination. Although in the more chronic myeloid leukemia x-ray treatment gave better results, even after a period of apparent cure, the symptoms were prone to recur, often in a more severe form.

[1] British Medical Journal, October 26, 1907.
[2] Jahrb. f. Kinderh., lxv.

Leukanemia. There are certain grave anemias, in which both leukocytes and erythrocytes are uniformly and markedly damaged, that are extremely difficult to classify accurately. Von Leube, in 1901, coined the term *leukanemia* to apply to these border line cases, which cannot be classified properly under the true leukemias or pernicious anemia. Drysdale[1] has critically analyzed a series of cases (collected from the literature) of so-called leukanemia, together with several of his own cases that are similar in character. From his studies he concludes:

"Within the term of Leube's definition there may be and have been described different conditions having only a superficial resemblance. Therefore the term is misleading, useless, and its use might be abandoned.

"The majority of cases so far described under this head belong to the group of atypical myelocytic leukemias, and might properly be described under that name.

"The acute myelocytic or 'mixed-cell' leukemia is a much more common condition than is generally supposed."

The suggestion that the term leukanemia be discarded agrees with the opinion expressed by Morawitz.[2] He reports 2 atypical cases of grave anemia following acute infections, in both of which there was enlargement of the spleen and myelocytes in the blood, without any increase in the number of leukocytes. Morawitz then concludes that at present it is unnecessary to adopt the term leukanemia to imply the existence of a separate disease.

A case which might properly come under the head of leukanemia, if this term is to continue in use, has been reported by Teeter.[3] His case was that of a child suffering from a sudden toxemia of unknown origin, which produced rapid hemolysis with marked stimulation of bone marrow and spleen. The spleen became enlarged, the blood picture was that of pernicious anemia, and the differential count showed as many as 10.75 per cent. of myelocytes. An interesting feature of the case was the complete recovery of the child. Cases of this kind in which an infectious process has been associated with a decided increase of myelocytes and a pernicious type of anemia have previously been observed by Von Leube, Luce, and Von Jaksch.

Hemoglobin Estimations. The value of the examination of the blood, both as a diagnostic and a prognostic aid, needs no defense. This form of clinical examination has become so important that its adoption as a routine procedure, not only in clinic and ward, but also in private practice, is almost universal. Without in the least detracting from the value of blood examinations, it must be conceded that the results obtained, especially from estimation of the hemoglobin, are approximately accu-

[1] Quarterly Journal of Medicine, October, 1907.
[2] Deutsch. Arch. f. klin. Med., lxxxviii, Nrs. 4 to 6.
[3] Journal of American Medical Association, February 16, 1907.

rate rather than absolutely so. On this account too much significance should not be attached to the minor variations that frequently occur.

Türk,[1] in a contribution upon the *color index* of red blood cells, emphasizes this fact, and further points out that unless blood examinations are carried out with care and accuracy, trustworthy conclusions are impossible. He has come to the conclusion that in health the actual numerical value of the erythrocytes and their hemoglobin content fluctuates considerably; but, on the other hand, the relationship between these two factors, namely, the color index, is quite constant. Türk insists that the same readings, made with various instruments, such as the Fleischl, Fleischl-Miescher, and Sahli hemoglobinometers, must not be regarded as truly equal, and should never be used as of equal worth in determining the color index. He has worked out the variations that exist between the above-mentioned forms of apparatus, and gives the correction that must be employed before readings made from them can be considered equal.

Finally, he states that the accuracy of the determined color index must always be proved by stained smears or the less certain examination of fresh blood preparations. He believes that with some experience one can estimate the color index with fair accuracy from the microscopic blood picture, and any gross discrepancy between the appearance of the blood of the smear and the determined color index can always be noticed. In thus proving the other findings by examination of smears, he thinks errors in counting or estimating hemoglobin become apparent. The existence of such errors demands that an entirely new examination be made.

The innumerable methods of hemoglobin estimation and the claims of accuracy advanced by the advocates of each have occasioned considerable discussion upon this point. Hastings[2] has tested for a number of years the various well-recognized methods, and as a result of his experience comes to some useful conclusions. He believes that the lack of correspondence in readings made with different instruments and the prevalence of inaccuracies in the ordinary hemoglobinometers are the result of faulty standardization in their manufacture. He found the Fleischl-Miescher instrument the most reliable, as it is obtained from dealers, and Gower's, Haldane's, and Sahli's instruments "practically all that one could desire, provided the instruments have been carefully standardized." On account of their simplicity of construction, easy technique, and the rapidity with which their colors may be standardized, he prefers the Haldane or Sahli instruments, especially the latter, because of the inconvenience of preparing the CO hemoglobin used with Haldane's apparatus, the acid hematin employed in Sahli's instrument

[1] Münch. med. Woch., liv, Nr. 5.
[2] Journal of American Medical Association, November 21, 1907.

being readily obtained. He uses as an acid solution with the Sahli instrument one-tenth normal HCl.

The Dare instrument he found excellent, but he had no opportunity to employ it extensively. It proved useless when cyanotic blood or the blood in plethoric conditions was being examined.

He regards the hemoglobin estimations made with the popular labor-saving device, the Tallquist scale, as "mere guesses;" for, although the presence or absence of anemia may be roughly determined, the true degree of anemia can never be estimated.

Blood Variations with Different Diets. Charteris[1] has made careful observations on a healthy man undergoing a prolonged fast of fourteen days. The blood changes were not striking. For the first few days the hemoglobin was unaffected, but toward the end of the first week it began to fall, and thereafter fell steadily. The reduction persisted for several days after a return to food was made. At the beginning of the period of fast, the hemoglobin was 101 per cent.; from this it fell to 86 per cent.; at the end of two weeks, after three days of taking food, it returned to 104 per cent. Aside from slight daily variations, no noteworthy effect was produced on the red cells. Stained smears showed no alterations either in size, shape, or staining properties, but during the last few days a few normoblasts appeared. Contrary to the findings of Luciani, Senator, and Müller, who noted some leukopenia as the result of starvation, this author found a moderate leukocytosis. On the first day the leukocytes numbered 5300 per cubic millimeter; by the eighth day they had risen to 14,000, from which point the number gradually fell, until, on the last day of the experiment, they were 9000. The differential count failed to show anything but an insignificant increase in the percentage of eosinophiles.

Keuthe[2] concludes from his observations upon the variations that occur in the different cellular elements of the blood during different diets, that the local formation of leukocytes in the digesting intestines depends upon the quality of food ingested. He believes the neutrophilic leukocytes play an important role in the absorption of albumin and fat, while the lymphocytes, during albumin digestion, undergo an absolute diminution in number. This diminution indicates a transition of lymphocytes to neutrophilic cells, which seem correspondingly increased.

Leukocytosis in Surgical Conditions. The practical utility of hematology is nowhere better shown than in the aid it affords the surgeon in arriving at a clearer understanding of the nature of the pathological process with which he has to deal. Sondern[3] has taken up this phase of the subject, and enthusiastically advocates the more systematic and complete exami-

---

[1] Lancet, September 7, 1907.
[2] Deutsch. med. Woch., 1907, Nr. 15.
[3] New York Medical Journal, January 26. 1907.

nation of the blood in surgical diseases. He believes that "the most important service the blood examination can render the surgeon is to give information concerning the presence or absence of an inflammatory lesion."

He insists especially upon the value of the differential leukocyte count, when taken in conjunction with the regular leukocytic count, as an additional aid in the diagnosis of acute inflammatory conditions. The greater his experience in such cases, the more he advocates this method of procedure. He holds that the increase in the number of polymorphonuclear cells shows the degree of "toxic absorption," whereas the leukocytosis indicates the resistance of the individual toward this absorption.

Deaver,[1] in his extraordinarily extensive experience, has been able to confirm the generally accepted belief that suppurative processes in any part of the body usually are accompanied by leukocytosis. In 100 recent cases of appendicular abscess he found the average leukocyte count to be 17,760. In view of the not infrequent difficulties met with in making the diagnosis of appendicitis from disease of the biliary tract and pyosalpingitis, he has given an interesting table of the comparative leukocyte counts in these conditions. In appendicitis with abscess, he found, as just stated, the average leukocytosis to be 17,760, and 90 per cent. showed a leukocytosis above 10,000. The average leukocyte count in pyosalpingitis was 13,000, and 67 per cent. of these cases had their leukocytes above 10,000; while in disease of the biliary tract the leukocytes on the average numbered only 9000, and in but 15 per cent. of these cases did they exceed 10,000. Along with Bernicot, Sondern, and others, he places no reliance on the iodophilia of polymorphonuclear leukocytes.

Among recent writers there seems to be no dissenting voice as to the value and importance of the blood examination in surgical conditions, especially of the leukocyte count in acute abdominal inflammation. Sonnenberg,[2] after expressing his belief in the value of the leukocyte count in the diagnosis of appendicitis, concludes that the degree of leukocytosis is not so important because it is an expression of suppuration, but because it is a guide to "the reaction of the organism," a low leukocyte count pointing to failure of the individual to resist the action of toxins.

This opinion of Sonnenburg represents essentially what is believed by Wile,[3] Boswell,[4] Cook,[5] and the others who have recently written upon this subject.

[1] New York Medical Journal, February 2, 1907.
[2] Archiv f. klin. Chir., lxxxi, Part II.
[3] American Journal of Surgery, June, 1907.
[4] Buffalo Medical Journal, April, 1907.
[5] Yale Medical Journal, November, 1907.

Localized Leukocytosis. Bartlett[1] has reported a most curious case, in which the leukocyte count, when taken from the fingers, toes, and top of the ear, was practically normal, varying between 7600 and 12,200. But when a count was made from the lobes of the ears the leukocytes were never less than 30,000, and did reach 300,000. This circumscribed leukocytosis fluctuated somewhat from day to day. Along with this strange leukocytosis there appeared phagocytic cells of atypical type.

The Effect of Antistreptococcic Serum on the Blood. Burkard[2] has observed the blood changes that occurred in the use of antistreptococcus serum in 16 cases of puerperal sepsis, three-quarters of these cases being pure streptococcic infections. Within the first day after the serum was used there was destruction of the neutrophiles. This destruction reacted detrimentally to the patient only in 6 of the cases, these seemed incapable of responding to the serum. In the remaining cases a noteworthy increase in the number of leukocytes occurred along with this destruction of the neutrophiles, thus counteracting any loss. In every case in which this prompt response was manifested recovery was rapid and complete.

Uhl[3] has accepted the teachings of Arneth as to the significance of the variations that occur in the nuclei of polymorphonuclear neutrophiles in infections. He has used the Arneth method as a criterion of improvement in his observations upon the effect of tuberculin and cinnamic acid on chronic pulmonary tuberculosis. The latter, he found, produced no improvement in the blood picture, at least, not according to the above named standard. Even small doses of tuberculin, on the other hand, caused a steady consistent gain in the condition of the blood.

Blood in Asthma. Salecker[4] has had the opportunity to examine carefully the blood in 14 cases of asthma. In half of this number studies were carried on during the actual paroxysm, and it is these findings which are of especial interest. He found that during, or immediately after, the asthmatic attack a marked leukocytosis occurs. This increase in leukocytes is largely a polymorphonuclear one, these cells usually making up 80 per cent. of the entire leukocyte count. During this period the mononuclear cells show some diminution in number, a decrease shared likewise by the eosinophiles. This abnormal blood picture only lasts for a few days, then it returns to normal until another paroxysm supervenes.

By reason of the ease with which vasomotor changes occur in nervous persons, it is well known that the results obtained from examination of their blood are frequently unreliable. Great discrepancies are found between the percentage of hemoglobin and the red cell count. This is well brought out by the findings of Goett,[5] who examined the blood of

[1] Boston Medical and Surgical Journal, May 16, 1907.

[2] Archiv f. Gynäk., lxxx, Nr. 3.

[3] Beit. z. Klin. der Tuberculose, Würzburg, vi, Nr. 3.

[4] Münch. med. Woch., liv, Nr. 8.   [5] Ibid., liii, Nr. 46.

four markedly neurasthenic young men. Their hemoglobin ranged between 82 per cent. and 100 per cent., while in each instance the red cells numbered about two and a half millions. Goett advances an explanation for this condition of the blood. He assumes that as a result of an unbalanced nervous system, extreme capillary dilatation occurs, from insufficient cause. On account of the dilatation the intracapillary pressure becomes so much lower than that of the surrounding tissues that fluids from these tissues are able to pass through the capillary walls, and then dilute the contained blood.

Blood Findings in Dengue. The blood picture of dengue has not been made the subject of investigation as frequently as has that of some of the commoner infections. Vedder[1] has carefully studied it, and has found that the most noteworthy and constant change that occurred in the blood of individuals suffering from this infection was the leukopenia. Differential counts show an early reduction in the percentage of polymorphonuclear neutrophiles present and, at the same time, some increase in the small lymphocytes. He has also observed a very slight eosinophilia.

Blood Crises in Typhoid Fever. Among the most interesting blood conditions occurring in the course of an acute infection, that have recently been reported, are blood crises in typhoid fever. Emerson[2] reports 2 such cases. The first case, on the twenty-first day of the disease, had a blood count as follows: hemoglobin, 55 per cent.; red cells, 3,752,000; leukocytes, 4200. On the next day small intestinal hemorrhages began to appear, and the leukocytes rose to 13,500. For the next three days there was hypothermia, leukocytosis, intestinal hemorrhages, and a condition of the abdomen simulating perforation. At this time the leukocyte count was 38,000, but a differential count showed that there were 7600 nucleated reds present, and that 28,000 was more nearly the true leukocyte count. By the twenty-eighth day of the disease the red cells were down to 1,006,000, and there were present many microblasts, megaloblasts, and intermediate forms. On the thirtieth day the patient died from exhaustion. At autopsy the Bacillus typhosus was isolated from the organs, and in pure culture from the bone marrow, which showed many microblasts and megaloblasts among its cellular elements.

Emerson regards the blood crises as a manifestation of the struggle made by the bone marrow against the anemia producing infection, but points out how unsuccessful this struggle was, as evidenced by the fact that the 3,896,000 red cells which the patient showed on admission were steadily reduced, until, two days before death, there were but 1,006,000 reds. He suggests the tempting theory that in this case the typhoid infection was especially localized in the bone marrow, where it caused widespread tissue destruction, a progressive anemia as the result of this,

---

[1] New York Medical Journal, August 3, 1907.
[2] Johns Hopkins Hospital Bulletin, October, 1907.

and "a vigorous yet futile effort of the remaining functionating tissue," as shown by the blood crises, to stop the process.

His second case of typhoid fever in which a blood crisis occurred died during the second week of the disease, and also showed marked leukocytosis and intestinal hemorrhages. On admission this patient had a blood count of hemoglobin 25 per cent., red cells 1,300,000, and leukocytes 85,000. Here, again, the differential count showed the leukocytosis to be lower than the leukocytic count had shown, this error being due to the presence of about 3500 nucleated reds. Blood cultures from this case gave the typhoid bacillus in pure cultures. Unfortunately, an autopsy was unobtainable; consequently, one can only speculate as to the probability of this second case also being one in which there was severe local infection of the bone marrow.

Both these cases point out the valuable lesson that high leukocyte counts should always be controlled by differential counts, thus correcting any error that may have arisen as the result of mistaking nucleated red cells for leukocytes.

Erythrocytes. Ross, Moore, and Walker,[1] by using a stain of polychrome methylene blue in saturated solution in 0.5 per cent. salt solution, have been able to demonstrate in some red blood cells "chromolinin granulations," previously referred to by these authors. These granulations occur in health as well as in disease, and are found within the cells as strings of granules. They attach some significance to the occurrence of these granules, and believe that the finding of an unusual number of corpuscles containing these granules indicates that red cells are being thrown into the circulating blood at a too early period in their development. Normally, about 1 per cent. of corpuscles are said to contain these granulations, but in tropical liver abscess they occurred in 6.6 per cent.; in chronic malaria in 11.5 per cent.; and with as great, or greater, frequency in other parasitic diseases, such as ankylostomiasis and kala azar.

Leukocytes. As far back as 1884 Einhorn attempted to simplify the technique of leukocyte counts by substituting the use of stained smears for the regular Thoma-Zeiss apparatus. Since then numerous efforts have been made to devise an accurate smear method. In 1902 Einhoin and Laporte elaborated the former's original method; and, more recently, Strong and Seligman, and Leishman have published more accurate smear methods. Larrabee[2] has carried out a large series of careful observations upon the accuracy of the various smear methods for counting leukocytes as compared to the usual methods with the Thoma-Zeiss or Türk slide. He concluded that, although experienced investigators can, by a study of stained smears, often determine with considerable accuracy the presence or absence of leukocytosis, the method is too uncertain even for rough practical work. He is con-

[1] Lancet, July 27, 1907.   [2] Journal of Medical Research, May, 1907.

vinced that the results obtained from smear counts are no better than those from simple inspection of smears, and save little if any time over accurate counts made with counting slides. He thinks that the recommendations of Einhorn and Laporte, that smear methods should be adopted for estimating the leukocytes in acute intra-abdominal surgical conditions, as appendicitis, is unjustifiable, since it is in such conditions, more than in any others, that unusual accuracy is desired, and in the hands of most workers the smear method is highly inaccurate.

STAINING FOR LEUKOCYTES. Guyot[1] has devised a method of staining blood which is claimed by him to be especially adapted to bringing out the leukocytes, and especially the degenerated forms. He maintains that the sources of error usual in methods of blood staining are absent from this technique, and that it has the additional advantage of staining blood smears that have been made some time, equally as well as those that have been freshly made. The various steps in the technique are as follows:

An ordinary coverslip preparation is fixed for twenty minutes to one half hour with formalin fumes (40 per cent.). This is washed in distilled water and stained with Foa's hematoxylin, the excess of stain is washed off, and a drop of the following mixture applied: one part of a saturated solution of Soudan III in alcohol (70 per cent.) and five parts of glycerin. At the end of ten to twelve hours the specimen is ready for examination.

Whatever advantages may be claimed by Guyot for his method, for the rapid clinical examination of blood, it is certainly not to be compared with several of the well-known methods now in general use.

MORPHOLOGY OF LEUKOCYTES. After a careful study of the mononuclear forms of leukocytes, both in the blood and blood-forming organs, with special reference to their protoplasm, Ferrata[2] has come to the conclusion that the unicellular round cells of the lymph glands, the blood, the kidneys, and the bone marrow form a continuous series of similar cells. The small and medium sized ones are the basic or root forms from which the larger ones originate. Within the protoplasm of all these forms he found basophilic granulations, which in the older forms give a metachromatic reaction.

Mühlmann[3] has made a study of the leukocytic granules with the ultramicroscope. As a result of his observations, he states that actively motile granules may be seen in living leukocytes, and that in his opinion Müller's blood dust is made up of fat particles in the blood.

Blood Plates. Kemp,[4] during his work on the microchemistry of blood plates, found that in blood stained, the moment it emerges, with methyl green, the blood plates exhibit granules which stain like the nuclei of leukocytes. With this stain, however, he was unable to demonstrate

[1] Gazetta degli Ospedali, xxxviii, 12 to 18.
[2] Virchow's Archiv, clxxxvii, Nr. 3.   [3] Berl. klin. Woch., xliv, Nr. 7.
[4] British Medical Journal, December, 1906.

"innenkörper" of definite structure. Kemp was unable to determine whether plates are derived from nuclei or whether they are independent elements containing nuclear matter scattered through them.

In high altitudes the increase in the percentage of plates in the circulating blood was greater than the increase which occurred in the number of red cells. Moreover, the average size of the blood plates also increased, and after about ten days a few were noted that were colored reddish in normal blood, so that, in several instances, plates could readily be mistaken for microcytes.

With nitro-ammonia molybdate, blood plates give a reaction which indicates that they contain phosphorus. When hydrochloric acid and pepsin are allowed to act on blood plates, there remains an undigested residue, which in its composition is presumably nucleoproteid.

Eosinophiles. Eosinophiles have claimed much of the attention of hematologists, and their exact origin has always been a matter of speculation. The most recent theory as to their formation has been advanced by Freytag,[1] who believes that the eosinophiles differ from the ordinary leukocyte in that they contain an excess of iron, which has been derived from erythrocytes. The prominent, deep-staining, eosinophilic granulations are the manifestation of this increased iron content. The ultimate fate of these eosinophile cells, according to this observer, is to become pigment cells.

Efforts are being made to attach diagnostic and prognostic importance to the increase or diminution of eosinophiles in the circulating blood under a variety of conditions. Blumgart[2] lays stress upon the importance of the eosinophile count in typhoid fever. The leukopenia of typhoid is a well-established fact; but this author states that there is, in addition, a marked diminution or complete lack of eosinophiles, a fact which lends no small aid in arriving at a diagnosis in suspected typhoid cases. He attaches prognostic significance to them when he asserts that if in the first week of undoubted typhoid there are eosinophiles present in the blood, the infection is a mild one and the outlook favorable.

The eosinophilia that occurs in *trichiniasis* is too well known to require much comment. Ottenberg[3] has summarized the histories of 8 cases of trichiniasis. Trichinæ were demonstrated in 3 of these cases, but the histories and symptoms of the other 5 cases were too typical to leave any doubt as to the diagnosis. In the entire 8 cases the one constant finding was the marked eosinophilia.

In connection with the above-mentioned observations on eosinophiles in typhoid fever, the work of Swan and Karsner[4] upon the *eosinophiles in pulmonary tuberculosis* is of interest. From a study of 31 cases of this

[1] Dublin Journal of Medical Science, October, 1907.
[2] Medical Record, New York, April 6, 1907.
[3] New York Medical Journal, March 30, 1907.   [4] Ibid., March 23, 1907.

disease they found that in all the fatal cases, of which there were 26, during the three months that preceded death the eosinophiles were less than 1 per cent. On the other hand, in the 5 cases which remained stationary or improved, the differential counts showed eosinophiles to be present in normal proportions, never falling below 1 per cent. They, therefore, attach considerable prognostic value to the eosinophile count in pulmonary tuberculosis; and conclude that the disappearance from, or reappearance in, the circulating blood of this form of leukocyte depends upon whether the disease is advancing toward a fatal termination or is tending toward improvement.

INTESTINAL EOSINOPHILIA. Neubauer and Stäubli[1] have reported in all 6 cases of high grade catarrhal affections of the lower bowel in which there were yellowish deposits over the injected mucous membrane of the rectum. In these cases the stools contained blood, and the yellowish deposits were composed of Charcot-Leyden crystals and eosinophiles. In addition to the intestinal eosinophilia, there was an excess of these cells in the circulating blood. The disease was of long duration and was subject to acute exacerbations, and occurred in individuals who manifested a "neurotic" tendency.

In spite of finding an occasional intestinal parasite of no great importance, the etiology of this condition remains obscure, but the authors draw an analogy between this form of intestinal inflammation and asthma, based upon the local and general eosinophilia, the presence of Charcot-Leyden crystals, the paroxysmal outbreaks, and the neurotic element present in these patients.

Fricher[2] reports 2 cases similar to the above in which there were pallor, diarrhea, paroxysmal in 1 case, along with blood and mucus in the stools, as well as Charcot-Leyden crystals and eosinophiles.

DIABETES.

Etiology. In reviewing the literature of the past year it is found that but little of importance has been added to our knowledge of diabetes as to either etiology or treatment. A new theory advanced is that by Senator,[3] who discusses the *contagiousness of diabetes*, and cites a number of examples which seem to suggest possible transmission. Among these is a case of diabetes in a woman whose husband's brother and his wife both had the disease; also a case developing in a man after his marrying into a diabetic family, both parents of his wife having diabetes. In another case, a physician, aged forty-two years, developed the disease not long after he had amputated, in another town, the leg of a patient

[1] Münch. med. Woch., liii, Nr. 49.
[2] Ibid., February 5, 1907.
[3] Berl. klin. Woch., xlv, Nr. 4.

suffering with diabetic gangrene. There were also living in the same street as did this physician four other men with diabetes, one of whom had a diabetic wife. Six cases of diabetes in a town of only 2500 people, and all among close friends and neighbors, one of whom kept a saloon frequented by the others, is certainly a remarkable coincidence. In Senator's own experience, he found the husband or wife also affected in 22 cases among 516 persons suffering from this disease, who were married. From this list he subtracts 3 cases in which the diabetes developed in both simultaneously after some great emotion, such as that caused by the burning or the death of a child. In the 19 cases of *conjugal diabetes*, an interval ranging from one to over fifteen years elapsed between the development of the disease in the first and the second party, the couples having all been married for from twenty-three to forty-two years. In 4 cases there was evidence of diabetic inheritance.

The total proportion of 37 per cent. is too small, Senator declares, to justify the assumption to date that diabetes can be transmitted from one person to another not a blood relation. Further research and compilations are needed to decide the question. Senator's experimental researches all gave negative results.

Labbé[1] thinks that not enough emphasis has been placed on the saturation of the blood and tissues of diabetics with glucose as the cause of the symptoms exhibited. He divides diabetes into two classes:

1. Those in whom the origin of the glycosuria is exclusively alimentary.

2. Those who form glucose from the albumin and fat ingested or even from their tissues. In the first class there is a defect in the ability of the organisms to burn sugar, and it accumulates in the tissues and the blood. An excess of sugar in the tissue is called hyperglycystia, and the excess in the blood, hyperglycemia. Diabetics differ in their power to oxidize glucose and the retention in the tissues begins when the amount of carbohydrates ingested is greater than that which they are able to oxidize. The accumulation of glucose in the tissues does not immediately produce any symptoms; but when a maximum is reached its excretion by the kidneys begins showing glycosuria. The necessity for an increase of fluids results in polydypsia and polyuria. The nervous symptoms follow in consequence of the saturation of the tissue fluids with glucose. The retention of glucose in the tissues explains the fact that glycosuria does not immediately follow the ingestion of an amount of carbohydrates above the degree of tolerance. On the other hand, the fact that glycosuria still continues after the reduction of the amount ingested to below that which can be tolerated is explained by the gradual excretion of the glucose which had accumulated in the system. Sometimes this excretion is so slow that the glycosuria continues for an indefinite period, but it is finally removed by absolute avoidance of carbohydrates.

[1] Presse Médicale, xv, No. 48 to 55.

Labbé says that it is not necessary, therefore, to conclude that the excretion of a small amount of sugar after carbohydrates have been entirely excluded from the diet, indicates that sugar is formed from ʹat or albumin. He has calculated that the organism of a diabetic weighing 132 pounds may contain in the body fluid, the liver, and the muscles a .quantity of carbohydrates in the form of glucose and glycosin equal to 678 grams. The ability of the organism to deposit glucose in the form of glycogen may modify the effects of the ingestion of an excess of carbohydrates. Experiments made by von Noorden have shown relative poverty in glycogen in the liver and the muscles of diabetics; and Labbé, therefore, suggests the possibility that glucose is retained in a form of .carbohydrates differing from glucose and from glycogen.

MacCallum[1] reports 2 very interesting cases of diabetes which came to autopsy. In the first case the pancreas in general was found to be normal histologically and chemically, but the islands of Langerhans were markedly hypertrophied. Histologically they were indistinct in outline; the cell columns were long, tortuous, and independent, being seldom more than one layer of cells wide, and they were everywhere directly continuous at their ends with the adjacent parenchyma; they stood out prominently by reason of the conspicuous nucleoli of their nucleus. In the head of the pancreas he found some lobular changes, in that there was an actual increase in the bulk of acinar tissue and their opponent cells. This increase is noted sometimes to have occurred in only part of a lobule, and, again, in the entire lobule.

The second case showed similar changes of hypertrophied islands, and in places hypertrophied lobular tissue. For this MacCallum has two hypothetical explanations, the first being that, as it is well known that there are extra pancreatic cases of diabetes, it is possible that in these cases there has been some disturbance of carbohydrate metabolism from extra pancreatic causes, which has imposed excessive work upon the islands of Langerhans, which, to meet the demand, have hypertrophied, and, indeed, are in some places actually newly formed from tissue of the pancreas, as seen by the hypertrophied lobules that have, to some extent, taken on the character of the islands. The second hypothesis is that the destruction of the islands produces diabetes, but also a subsequent regeneration of the islands. There were no evidences of such a condition shown, as by scars or degenerated tissues. The islands were all in a healthy secreting condition, and had every appearance of normal functional ability. He, therefore, views the hypertrophy as compensatory in nature.

Brugsch,[2] in reviewing the experimental evidence of the etiological role of the pancreas in the production of human diabetes, noted that excision of the pancreas produces glycosuria, but no abnormal metabo-

[1] American Journal of Medical Science, March, 1907.

[2] Therapie der Gegenwart, xlvii, Nr. 8.

lism of fats.   Animals, after extirpation of the pancreas, never die in coma.   A physiological acidosis occurs when the carbohydrates are withdrawn from the diet, but the acidosis which occurs in diabetes is pathological and never occurs as the result of extirpation of the pancreas in animals.   The occurrence of a severe form of diabetes with oxybutyric acid and acetone in the urine, and with symptoms of coma, indicates that the cause of the disease is situated elsewhere than in the pancreas.   The absence of these symptoms, however, is no certain sign that the disease has its origin in the pancreas, or a severe form of diabetes may run its course for a long time under the form of a simple glycosuria.   The fact that glycosuria may arise from affections of organs other than the pancreas indicates a possible participation of these organs (thyroids, adrenals, etc.) in the production of diabetes.   The surest evidence that the pancreas is the organ at fault is a disturbance in the digestion and the absorption of the food, especially the fats and proteids.   The occurrence of colicky pain in the upper part of the abdomen corroborates the view that the pancreas is affected.

The differentiation of a pancreatic from a non-pancreatic diabetes is important from a therapeutic standpoint, as it enables the diet to be suitably regulated.   In such cases the glycosuria will disappear on the withdrawal of the carbohydrates, providing sufficient fat and proteids are given to cover the caloric needs of the organism.   In pancreatic diabetes, he considers that emphasis should be laid on the pancreas rather than on the diabetes.

Lépine,[1] in carefully considering the subject of the nature and action of the internal secretion of the pancreas, thyroid, hypophysis, and suprarenal capsule, comes to the conclusion that the internal secretion of the pancreas plays an important part in the pathogenesis of pancreatic diabetes, owing to its importance as a stimulator of general glycolysis. It is probable that in cases in which the functional activity of the pancreas is reduced from any cause, the reduction in the amount of its internal secretion is an accessory factor in the production of a diabetes for which other causes are directly responsible.   Other secretions probably exert a more or less important action on the carbohydrate metabolism.   This has been experimentally established for some of them, but the clinical data are not sufficient to affirm whether or not they intervene in an effective manner as adjuvant causes of diabetes mellitus.

He has recently announced experimental research demonstrating that the glycosuria observed after the injection of suprarenal extract has the same characteristics in dogs that have had the pancreas removed as in normal dogs.   His experiments prove the existence of a transient suprarenal glycosuria and suggest the possibility that abnormal functioning of the suprarenals may aid in the production of diabetes in man.   This

[1] Deut. Archiv. f. klin. Med., lxxxix, Nrs. 1 to 4.

assumption is not sustained by any clinical data to date; and, on account of the large amount of suprarenal extract required to induce the disease, and in the way in which the system soon becomes accustomed to an increased amount, the assumption does not seem very probable.

The influence on glycolysis displayed by the pancreas is not a special function, nor is it due to special elements, such as the islands of Langerhans; it is merely, Lépine thinks, a functional activity which it shares with other organs.

Zuelzer[1] is convinced, from his experimental work, that the pancreatic secretion and the secretion of the suprarenals have an antagonistic action. He thinks that what has been called pancreatic diabetes is in reality more of a suprarenal diabetes.

Klemperer and Umber[2] claim that fat is often found in the blood in severe cases of diabetes, and especially in cases of diabetic coma. Fat was found by them in the blood of two patients having diabetic coma and in 3 cases of severe diabetes, 1 of which later went into coma, and is included in the first named. It was not found in a case of mild diabetes, nor in the blood of a dog from which the pancreas had been removed as a control. It was found in a very small amount in the blood of 5 patients who did not have diabetes. Therefore, these investigators have come to the conclusion that fat in the blood is not characteristic of severe diabetes nor of diabetic coma.

That diabetes is not a disease *per se* is fully discussed by Oren,[3] who considers it a condition, symptom, or sequela of one or more diseases or of diseased organs. This then may cause dyscrasia with symptoms of inordinate hunger and thirst—usually with disordered nutrition—and an excessive polyuria in which there is a persistent amount of sugar. This form usually progresses until there is exhaustion, with general wasting, and usually fatal termination by some secondary disease.

Transient glycosuria is still being studied, and an article by Barringer and Roper[4] discusses very carefully 20 cases of transient glycosuria which occurred between 1895 and 1901. Twenty per cent. of these patients had become diabetic at the end of five years, 15 per cent. were considered suspicious, and 10 per cent. somewhat suspicious, while 55 per cent. showed no traces of diabetes whatever. Eight out of 11 cases of spontaneous glycosuria in which there had been a recurrence of sugar, became diabetic. The authors think that if the test is properly conducted, and repeated at regular intervals, that alimentary glycosuria caused by glucose or cane sugar, affords a valuable aid to prognosis in cases of spontaneous glycosuria, a positive test being of much more value than a negative one. Alimentary glycosuria with sugar is essentially diabetic.

[1] Berl. klin. Woch., xliv, Nr. 16.   [2] Zeit. f. klin. Med., lxi, Nrs. 1 to 2.
[3] Illinois Medical Journal, February, 1907.
[4] American Journal of Medical Sciences, 1907

The condition of the *heart and the blood pressure* in diabetes have been carefully explained by Elliott[1] in an exhaustive study of 25 cases. He asserts that in severe progressive forms of diabetes, increased blood pressure is always due to complications—such as arteriosclerosis and chronic nephritis, which are at the root of the so-called diabetic heart conditions—rather than diabetes *per se*. Any attempts to establish the existence of certain cardiac conditions peculiar to diabetes, as diabetic heart, has little justification from evidences based on blood pressure in this condition. In this series of cases, after excluding those with arteriosclerosis and nephritis, the average blood pressure was 115 (normal); and it may be said that the disease itself is without influence on the arterial pressure.

An interesting contribution has been made by J. C. DaCosta, Jr.,[2] in his preliminary report showing the action of the *opsonic index* in 22 cases of glycosuria. Of these 22, there were 16 cases of diabetes mellitus, 4 of diabetes insipidus, and 2 of accidental transient glycosuria.

DaCosta used as the bacterium with which to determine the opsonin values in every test the Staphylococcus pyogenes aureus. In the cases of true diabetes mellitus, all had subnormal opsonin indices, ranging between 0.34 and 0.72. In the 4 cases of diabetes insipidus they ranged between 0.82 and 0.89; and in the remaining 2, 1 showed an index of 0.81 and the other of 0.91. Of these last 2, 1 was a case of glycosuria following an operation, and the other was caused by the use of malt liquors in excessive quantities. The author says that this only establishes the fact that diabetic patients show a feeble resistance to staphylococcic infections, which may help somewhat to explain the frequency of abscesses, carbuncles, or similar conditions in diabetics.

Eshner,[3] in his article on the relation between *diabetes and pregnancy*, concludes with the following summary: There is evidence to show that the power of assimilating carbohydrates is diminished in conjunction with pregnancy, and this deficiency may be manifested by the presence of sugar in the urine. Transitory glycosuria, such as is found at the end of pregnancy, is a resorption phenomenon. Diabetes is an uncommon complication of pregnancy, partly because the disease is less common in women than in men, but principally because it occurs, as a rule, at a later period of life than that at which pregnancy usually takes place Occasionally diabetes has been noted in two or more successive pregnancies. Pregnancy occurs but rarely in diabetic women, for, in addition to the reasons already given, there are the depraved condition of the diabetic and the disordered function and structure of the internal generative organs. The complication of the one condition with the other usually increases the gravity of both. Often the fetus dies in utero,

---

[1] Journal of American Medical Association, July 6, 1907.
[2] American Journal of Medical Sciences, July, 1907.
[3] Ibid., 1907

and miscarriage or premature labor takes place; or the child may die during birth or shortly afterward. The child may also be a diabetic. The liquor amnii has been found increased in amount, and in some instances to contain sugar. The mother often dies of the disease, some times during pregnancy, or at childbirth, or shortly after delivery. For this reason a diabetic woman should not marry; or, if married, she should not become pregnant. In the event of a diabetic woman becoming pregnant, or of a pregnant woman becoming diabetic, pregnancy need not be interrupted artificially unless some special indication arises. If the woman is safely delivered, she should not nurse her child.

Tests for Sugar. In some cases where diabetes is suspected, ambiguous reactions are sometimes obtained when testing for sugar. In order, therefore, to confirm Fehling's test in the presence of glycuronic acid, Longworth[1] takes 2 to 3 c.c. of urine and dilutes it with an equal quantity of water, then adds 1 gram of phenylhydrazin hydrochloride and 0.5 gram sodium acetate. To this mixture there is added 10 c.c. of a 10 per cent. solution of caustic soda. After inverting the test-tube two or three times, it is allowed to stand. A pink to red coloration of the whole liquid occurring within five minutes is to be regarded as an indication that sugar is present in proportions of clinical significance.

In order to test for sugar by the fermentation test, Schumm[2] has devised a new saccharometer which differs somewhat from that of Einhorn's, in that the closed end becomes slightly attenuated. It is said to permit the estimation of the slightest amount of gas present, although it is a more difficult apparatus to fill with urine.

Treatment. There has been but little advance made since last year in the treatment of diabetes, and, as might be expected, the question of diet is the chief one discussed.

Tyson[3] says that in the treatment of the diabetic, the proteid food should be increased, but the carbohydrates only in moderation, as they can be supported. The patient should be tested every few weeks by the absolute withdrawal of carbohydrates; and if the sugar is absent then, the disease is still under control, and the patient allowed to use a certain amount of carbohydrates. He thinks it wise also to withhold the fats to a certain degree, as their oils form acids, which increase the danger of acidosis. Until the disease is under control, all sugars should be withheld.

He considers gluten or starch-free breads very unsatisfactory, since most of them contain starch, and those which do not are unpalatable or too expensive.

He sometimes uses arsenic and codeine, but he thinks that organotherapy is unsatisfactory.

[1] British Medical Journal, July 6, 1907.
[2] Münch. med. Woch., liv, Nrs. 24 und 25.
[3] Journal of the American Medical Association, November 9, 1907.

Jaquet[1] cautions us to remember that diabetic patients are much more susceptible than others to any disease, and great care must be taken in treating them, especially elderly persons. The very fact that they have sugar in their urine indicates that their resistance is below normal, and care must be taken while trying to reduce the quantity of sugar not to put them suddenly on too strict a diet. A diabetes which appears to be harmless may at any time become suddenly grave.

On the question of diet, Jaquet says that one should be formulated which is as large and as varied as possible, so that the patient shall not suffer any unnecessary privation. If the case is being treated at home, he thinks it best to go gradually about reducing the amount of sugar. If the treatment is undertaken in a hospital, then it must be done as rapidly as possible, since the patient does not wish to have to remain in an institution any longer than is necessary.

Care must be taken not to keep the patient too long on a very severe regimen, for not only will it soon be refused, but experience has shown that, prolonged beyond a certain limit, it is often followed by a diabetic coma. Therefore, just as soon as the glycosuria begins to be controlled, it is best to allow small quantities of carbohydrates to be used—such as 50 grams of bread or 200 grams of milk. Naturally, this will increase the glycosuria, but the patient's general condition will be much better. There may be one day a week on which meat, eggs, and all carbohydrates are eliminated from the diet, thus permitting the system to get rid of the excess of sugar accumulated and to recover, to some degree, its equilibrium. Success has attended a treatment which consisted of placing the patient on a strict diet for two or three weeks about every third month. In doing this, it must not be forgotten, however, that each case must be treated individually, and the general condition carefully observed.

Hall[2] appends to his article the following classification by Von Noorden and Naunyn, which may be found useful for the interpretation of the tolerance factor:

1. *Slight Glycosuria.* The urine may contain sugar when starchy foods are taken by the mouth. Some cases can tolerate 150 grams of starch per day without developing glycosuria, but excrete sugar with an intake of 200 grams.

2. *Medium Glycosuria.* Under this heading are placed those cases in which, in addition to the carbohydrate restriction, the proteids must be limited, so that the total nitrogen output lies between 10 and 18 grams per day.

3. *Severe Glycosuria.* This group includes those cases which, in the absence of carbohydrate food, the glycosuria continues, unless the proteid intake is reduced so as to keep the urinary nitrogen well under 10 grams per day.

[1] La Semaine Médicale, xxvii, No. 47.   [2] Practitioner, July, 1907.

Labbé[1] has been studying the comparative tolerance which diabetics have for potatoes. He found that in 6 out of 7 cases the starch in potatoes was much better tolerated than that in bread; and only once was the latter better assimilated than the former. It seems that potatoes are far better tolerated than milk and sugar, while they have several advantages over wheat flour and pod vegetables. In equal weights of potato and bread the latter contains from two to three times as much carbohydrate as the former. A single potato at a meal represents from 100 to 200 grams a day; that is, only from 20 to 40 grams of carbohydrates; while the bulk of the potato is more satisfactory to the patient than the equivalent small amount of bread.

Other advantages of potatoes in an antidiabetic diet are that they allow large amounts of butter, etc., to be incorporated with them, and the variety of ways in which they can be appetizingly prepared. The amount of potato allowed the patient should be kept within the limit of his tolerance for carbohydrates.

Munter[2] says that in the treatment of diabetes the fundamental thing is the diet, based upon the needs of the individual patient, and that every other therapeutic measure is but an aid in the dietetic treatment. It is necessary to watch that the patient assimilates the food taken and to see that he is given sufficient calorics in albumin, fat, alcohol, and easily assimilated carbohydrates.

As physical measures, there may be employed the temperature—as heat and cold in the form of air, water, or baths—electricity, gymnastics, and massage. Whether hot or cold water baths should be used, and whether they are likely to prove beneficial, depends entirely upon the general condition of the patient. Their use must be decided separately for each case.

Electricity may be of great use in diabetes, especially in some of its complications, such as neuralgia and neuritis. The galvanic current should be used with the anode on the affected part; the faradic and mixed currents may also be used at times. Electrical baths have sometimes appeared to be effective, but they must be used with great care.

A certain amount of muscular exercise in cases of mild diabetes is often a great help in keeping down the amount of sugar in the urine.

In *diabetics suffering from pulmonary affections*, Thorspecken,[3] who has had considerable experience with this combination, finds that careful treatment gives excellent results. He advocates treating the diabetes with the same energy as if it were without the pulmonary complications. In one of his cases a tuberculous affection of the larynx healed as the patient was cured of glycosuria, and the patient remained in good health for sixteen years. In another case both upper lobes were involved, and the patient was badly emaciated; yet after being under treatment for

---

[1] Presse Médicale, xv, No. 82.   [2] Berlin. klin. Woch., xliv, Nr. 17.
[3] Münch. med. Woch., liv, Nr 7.

diabetes he was so much improved that he was able to take up his work again, and had gained almost twelve pounds in weight. In still another case, in which there had long been a latent tuberculous process, it suddenly flared up again on the development of diabetes.

Labbé,[1] in discussing the subject of diet, holds that when a diabetic is fed carbohydrates, some is stored up while the excess is excreted; and a patient's tolerance for carbohydrates is the amount he can take without secreting sugar. In making up a diet, Labbé always gives the patient 10 grams less than his tolerance for any one substance. He also discusses two classes of cases: first, those associated with loss of nutrition, and second, those in which there is no loss of nutrition. The dietary which he prescribes consists of four parts: first, the fundamental carbohydrates; second, the accessory carbohydrates; third, the albuminous fatty, and alcoholic foods; fourth, the forbidden foods. He urges that these be prescribed by weight, and never left to the patient's caprice. He also says that that diet which has a powerful curative effect on diabetes without loss of nutrition is most frequently ineffective in cases of diabetes in which there is loss of nutrition.

In young diabetics, Brunton[2] says that there is a tendency to malnutrition of the cardiac muscle and the cardiac nerves, which leads to some functional derangement, and possibly sudden death. At the same time there seems to be atheromatous changes in the vessels, and especially in the coronary arteries, which may bring about fatty degeneration, feebleness of the heart, and angina pectoris. Therefore, in any case of tachycardia, palpitation, or cardiac weakness and dilatation in a diabetic, which is not complicated by gout, he gives calcium phosphate or lactophosphate, and a proteid diet, with a minimum of carbohydrates, is indicated.

Digitalis must be used with caution in cases of gouty glycosuria, although it is very useful in diabetes which is not complicated by gout.

This author has found that a combination of sodium salicylate or other salicyl derivatives, with codeine, is serviceable at times.

Soules[3] has had very good results from the use of the fluidextract of chimaphila, which was given in dram doses at meal time in a glass of milk. In a case which he had under observation for eight years, this treatment would cause the sugar, which often reached 10 per cent., to disappear from the urine in less than a month. As soon as the sugar disappears he advises the use of arsenic in gradually increasing doses, still continuing the use of the chimaphila, and at the same time observing a careful diet.

Parsons,[4] in summing up the treatment of diabetes mellitus, says:

1. There is no specific treatment for diabetes.

2. Drugs play at best only a subsidiary part in diabetic therapeutics.

[1] Practitioner, July, 1907.   [2] Loc. cit.
[3] New York Medical Journal, November 16, 1907,   [4] Practitioner, July, 1907.

3. Opium is the best antiglycosuric drug at present available. It may be administered in any stage of diabetes, but is most useful in severe cases, in which a rigid diet fails to remove all sugar from the urine. Dose: 1 to 5 grains of the extract.

4. Sodium salicylate and aspirin are valuable in mild cases of diabetes, and may temporarily completely remove the glycosuria. Dose, 15 grains three times a day.

5. Jambul may be used as an alternative to sodium salicylate or aspirin.

6. A positive ferric chloride reaction indicates the daily administration of bicarbonate of soda in doses of 150 grains and upward.

7. The intravenous injection of 35 ounces of a 3 to 4 per cent. solution of carbonate of soda affords the best chance of restoring consciousness in diabetic coma.

8. Constipation should be guarded against in all stages of diabetes.

Siciliano[1] claims that he has obtained very good results in several cases of diabetes which he had treated with the high-frequency current, the urea and sugar both being reduced to a marked degree.

In the alkali treatment of diabetes, Folin[2] considers it much better to use instead of the simple sodium carbonate solution an equivalent mixture of sodium, potassium, calcium, and magnesium, as the superiority of salt mixtures over any one salt has been abundantly demonstrated.

Séjournet[3] found that when santonin was used in diabetes the sugar was reduced, the polyuria decreased, and the patient's strength improved. Thirst diminished and the mouth was less dry. An average dose was given two or three times a day, according to the severity of the disease, and should be taken at meals; at the same time plenty of alkaline should be taken.

GOUT.

Etiology. The at one time supposedly clear etiology of gout has become more obscure as the theory that gout is due to an excess of uric acid has been accorded less and less prominence. Recent writers are inclined to regard gout as a definite disease, dependent upon some complex perversion of metabolism, the nature of which, though probably specific, is as yet unknown to us.

Mercier[4] has a special interest in this affection, being himself a victim of gout. After some ingenious arguments, he advances three hypotheses as to the cause of gout. He says that if uric acid in the blood

---

[1] Gazetta degli Ospedali, August, 1907.
[2] Journal of American Medical Association, xlix, No. 2.
[3] La Quinzaine Thérapeutique, March, 1907.
[4] Lancet, June 15, 1907.

is the sole cause of gout, it should occur whenever the kidney function is sufficiently impaired to cause the excretion of urates to fall below normal. Yet gout in acute nephritis is unheard of, and chronic interstitial nephritis is more apt to be the result than the cause of gout. If due to an excess of urates in the blood, gout should never appear unless there is impairment of the function of the kidneys, whose capacity for excreting urates is well known. If, on the other hand, gout is the result of some special combination of uric acid, which the kidneys fail to excrete, it is conceivable that the combination presented to these organs may have a damaging effect on the renal epithelium. Whereas it is quite inconceivable that these kidney cells should be injured by the one substance which it is their principal function to excrete.

Thus, he leads up to his first hypothesis, which is that gout, although indirectly due to uric acid, is not the result of an excess of this substance, but, rather, is due to a qualitative alteration of the urates in the blood. Such a theory explains why beer and champagne, containing but little purin, can induce severe gout; whereas sweetbreads, which are one-half purin, rarely bring on gout. The beer and champagne furnish some constituent which combines with even a small quantity of the systemic uric acid to form a complex injurious urate. It likewise explains why psychic states, in which there is frequent alteration of metabolism, often precipitate gout.

His second hypothesis is that gouty manifestations are not always produced by the same uric acid compounds, there being probably many urates, all equally deleterious and proof against elimination by the kidneys, which are capable of producing pathological effects.

Because some urates differ chemically, he believes, offers an explanation of why colchicum acts as a "specific" in gout at one time and produces no effect at another time. Colchicum, when it does good, does so by combining with the toxic urate in the blood, which then ceases to be noxious, and is rendered capable of removal by the kidneys.

"The varying manifestations of the gouty diathesis," Mercier states, "are due to varying but allied combinations of uric acid, probably with various but allied organic substances."

In his third hypothesis he considers why the first metacarpophalangeal joint is the one chiefly involved in gout. Mercier points out that if the usually accepted view is true, that this joint is the seat of urate deposits largely because of the slight vascularity of the tissues at this point, why would the cornea not be the most favorable place for such deposits of urates? As it is, their occurrence there is unheard of. He suggests the novel idea that the combination of uric acid with its organic element is broken down and converted into urate of soda by a substance secreted by the articular cartilage. This separating of the urate from the blood and its subsequent deposition in the joint, he regards as a conservative process of nature whereby the organism as a whole is protected. He

believes it by no means inherently improbable that one function of articular cartilage is to elaborate a precipitant for some of the uric acid combinations that are specially harmful and that are proof against elimination by the kidneys.

Additional observations on the etiology of gout have been made by Ebstein,[1] whose views may be summarized by stating that gout is due to a definite metabolic disturbance, probably largely confined to the cell nuclei, inasmuch as it is the metabolism of nucleins that is chiefly at fault in the production of this disease.

This view, that gout is the result of disturbed nuclein metabolism, is further substantiated and confirmed by the experimental work of Brugsch and Schulenhelm.[2]

In another place Ebstein[3] refers to the association of gout and pneumonia. He cites the cases of two individuals, neither of whom had had gout until it developed suddenly and acutely soon after pneumonia.

Symptomatology. Bull[4] enumerates and discusses the various *eye lesions found in gout.* They are chiefly conjunctivitis, edema of eyelids, chorioiditis, retinitis, optic neuritis, and disturbances of the extraocular muscles. These eye conditions often resist treatment for a long time, but rapidly improve after the occurrence of some acute manifestation of gout elsewhere in the body.

Ebstein[5] refers to a group of conditions that are not infrequently observed in those children who, during adult life, become the victims of gout. The most important of these conditions are recurrent attacks of pharyngitis and general catarrhal inflammation of the upper air passages, eczema, gastro-intestinal disturbances, epistaxis, migraine, and persistent highly acid urine.

Mendel[6] has studied the relationship that exists between *gout and mental disturbances,* and his conclusions are as follows:

1. In rare instances acute psychoses occur after a severe attack of gout associated with fever. These psychoses are characterized by mental dulness and persistent hallucinations, clinically designated as "delirium hallucinatorum."

2. In a very few cases an attack of gout is replaced by an acute psychosis, which usually terminates in a shorter time.

3. It is exceedingly rare to observe a beginning attack of gout bring a psychosis to a favorable termination after it has existed unchanged for as long a time as a year.

4. The co-existence of a psychosis with an attack of gout is so rare an event that, from the experience hitherto obtained, one is not justified in speaking of a "gout psychosis."

---

[1] Deutsch. med. Woch., xxxiii, 16.   [2] Therapie der Gegenwart, xlviii, 24.
[3] Münch. med. Woch., liv, 34.   [4] Annals of Ophthalmology, April, 1907.
[5] Deut. med. Woch., xxxiii, 16.
[6] Deut. Archiv f. klin. Med., November 27, 1906.

The saying of Griesinger, that the existence of mental disturbances due to the definite influence of gout cannot be spoken of with positiveness, holds as good today as when he first said it.

Treatment. The treatment of gout has been carefully and systematically dealt with by Luff.[1] The method of treatment advocated by him is based upon his conception of the etiology of this disease. This is, in brief, that the intestinal tract is the organ primarily concerned in the production of gout. There is faulty metabolism in the intestines and in the liver, with the result that toxins are produced, which lead to an auto-intoxication, which, in turn, causes a deposition of sodium biurate in certain joints.

He considers treatment under four heads:

1. The treatment of the gouty paroxysm in cases of acute gout and the relief of pain as speedily as possible.

2. The treatment of the subacute or chronic conditions and the prevention of the recurrence of an attack.

3. The treatment of the affected joint or joints, with the object of removing the uratic deposits and of preventing permanent deformity.

4. The treatment of the various forms of irregular or abarticular gout.

In treating acute gout, he advocates, first of all, a brisk mercurial and saline purge, absolute cutting off of food for twenty-four hours, the taking of large amounts of water, the application of heat to the affected joint, together with rest and elevation, and the use of the wine of colchicum internally.

This drug does good, he thinks, because it increases the secretion of the gastro-intestinal mucosa, thus preventing the elaboration in the intestines of more toxins.

He recommends 7 grains of veronal or 10 of trional to control the pain and cause sleep. If these fail, the extract of hyoscyamus, in full doses, may be used, but opium in any form should be avoided whenever possible, because of its tendency to interfere with elimination.

In the treatment of subacute or chronic gout, Luff gives, in addition to small doses of colchicum, guaiacum resin in 5 to 10 grain doses. Along with this some alkaline diuretic, as potassium citrate, may be given to advantage. Potassium iodide he has found of service in reducing the chronic inflammatory changes which occur about the affected joint or joints.

The local treatment of chronically involved joints is best carried out by means of alternating cold and hot douches to the affected part, followed by massage and hot salt packs applied during the entire night, and repeated every night for some time.

Luff lays great stress upon the dietetic treatment, since he holds that the gastro-intestinal tract furnishes the most important source of infection in gout. The indiscrete ingestion of food, especially proteid food,

[1] Practitioner, February, 1907.

tends to increase the number of bacteria present in the intestines, and promotes an inflammatory condition. A nitrogen equilibrium is the ideal sought after in gout, and in most individuals this can only be accomplished by cutting down the usual intake of proteid food. On the other hand, it is equally undesirable and unnecessary to exclude all animal food from the dietary of the gouty, for in the majority of these patients a properly adjusted quantity of proteid is not only useful, but is actually more easily digested than are the farinaceous foods. No fixed diet can be adopted which will be suited to every case of gout. Each case should merit careful study and observation in order that that diet may be determined upon which is best suited to the peculiar needs of the individual. Above all, as Luff remarks, regardless of the quality of any diet, the most important point to insist upon is moderation in eating and drinking.

Alkan[1] claims excellent results in acute gout from the use of constriction hyperemia and hot applications to the inflamed joint. By this treatment the pain was rapidly and effectually relieved. The method used by him consisted in making constriction above the ankle and applying hot applications to the inflamed toe. After two hours the constriction was relieved, the foot elevated, and cold applied to it. Two hours later, heat was again applied for a number of hours; at the same time the bowels were thoroughly opened and gentle sweating was induced.

HODGKIN'S DISEASE.

When one considers the obscurity and uncertainty that always have surrounded and continue to surround the etiology of pseudoleukemia, every effort to shed additional light upon this much discussed affection must be viewed with interest. It is along these lines that White[2] has made investigations that are not only interesting but decidedly suggestive.

White, being familiar with the frequency with which spirochetæ of various forms are found in the lymphoid tissues, and knowing how often a history of tonsillitis and enlarged tonsils precedes the development of Hodgkin's disease, was led to undertake an examination of the glands from pseudolymphatic leukemia for spirochetæ.

In the glands from two cases of Hodgkin's disease examined White was able, in both instances, to demonstrate the presence of innumerable spirochetæ. The sections of these glands were variously stained, by Levaditi's method, or by Giemsa's stain, or by iron hematoxylin and eosin. With this latter stain the organisms stained a deep black. In many respects, the spirochetæ found appeared identical with the Spirocheta pallida. The spirochetæ were found not only within the cells, but

---

[1] Therapie der Gegenwart, xlviii, 1.
[2] Journal of American Medical Association, August 31, 1907.

also in the bloodvessels themselves, the latter fact strongly suggesting that during life they might be isolated from the blood stream. The extraordinary number of these organisms that were found precludes the possibility of their presence being merely accidental. White believes the finding of the spirochetæ in pseudoleukemia presents three possibilities:

1. Either the spirochetæ were the etiological factor in the enlargement of these glands; or

2. The glands were infected secondarily with Spirocheta pallida; or

3. Hodgkin's disease may be a mild form of lues, as tuberculous glands are a mild form of tuberculosis.

In a later communication White and Proscher[1] report the finding of spirochetæ in a pseudoleukemia of three years' standing. In this case, during the life of the patient, three different glands were aspirated. Smears of fluid obtained in this way gave spirochetæ in each substance, and particles of cheese-like material obtained on aspiration proved to be solid masses of spirochetæ. These organisms were slender, curved, pointed at both ends, and about twenty microns long.

On the other hand we have the statement of Coley[2] that every case of pseudoleukemia is a form of sarcoma. He substantiates this statement by a report of four cases that were under his personal observation. These cases in their clinical course accurately resembled Hodgkin's disease, and for a time some of them showed improvement under the x-rays. Eventually they all succumbed to metastatic growths, thus proving, to Coley at least, the sarcomatous nature of this affection.

The association between *tuberculosis and Hodgkin's disease* has been noted many times, and not a little discussion has arisen over the diagnosis of tuberculous lymphadenitis from the disease under consideration. The difficulties sometimes offered in making a diagnosis of these conditions from each other is emphasized by a case reported by Groover.[3]

A boy, aged seven years, in whom there was marked cervical lymphadenitis, suffered from a bad cough and general malnutrition; as he became progressively worse his spleen enlarged; but there was no leukocytosis. Clinically the diagnosis rested between tuberculosis and pseudoleukemia, and was uncertain. At autopsy one cervical gland ruptured and appeared caseous within, the spleen was much enlarged and on section presented an appearance much like that found in tuberculosis, but by no means typical of that infection. In the report of this case there is no record of any bacteriological examination, and, as not infrequently happens, even after necropsy, the diagnosis remains obscure.

A further instance of the confusion that may occur between tuberculosis of lymph glands and pseudoleukemia is recorded by Jacobaeus.[4]

[1] Loc. cit.   [2] New York Medical Journal, March 30, 1907.
[3] Washington Medical Annals, June, 1907.
[4] Zeit. f. klin. Med., lxiii, Nr. 1 to 4.

In a young man with chronic enlargement of the lymph glands, especially the cervical ones, the diagnosis of pseudoleukemia was made, and treatment with Röntgen rays was instituted. After eleven exposures of twenty minutes each the glands rapidly subsided, then the spleen enlarged, but also subsided under the x-rays in about a month. The blood picture had remained essentially normal all the time. Soon, however, the patient developed fever, signs of acute miliary tuberculosis, and died. The autopsy findings indicated that tuberculosis was the primary affection in this case. The x-rays had caused the lymphoid tissue of the glands to be converted into fibrous connective tissue. Moreover, it is unlikely that the exposures to the Röntgen rays induced any intoxication, since no such general symptoms were noted, and during the time the patient was receiving treatments he gained in weight.

An interesting and important manifestation of pseudoleukemia is the group of *gastro-intestinal symptoms* that sometimes occur. Hoffman[1] points out how pseudoleukemia may be of a gastro-intestinal type, as illustrated by a case of his, in which for years there was persistent diarrhea with neither pus nor blood in the stools, and at times vomiting. He further states that several cases are on record in which not only did pseudoleukemia resemble typhoid, but rupture of swollen glands actually occurred, causing peritonitis and death.

That in some instances x-ray treatment produces favorable results in the treatment of pseudoleukemia is borne out by the experience of Wikner,[2] who records an instance in which, so far as arresting the clinical course and alleviating the symptoms are concerned, the cure of a case of pseudoleukemia was effected by exposure to the Röntgen rays.

CHLOROMA.

Pope and Reynolds[3] have made a careful bacteriological investigation of a case of chloroma. They have succeeded in demonstrating a bacillus which both morphologically and in staining affinities bears a marked resemblance to the Bacillus mallei. The distribution of this bacillus in these cases is precisely that of the pigment. They are found abundantly in the nuclei of the cells immediately adjacent to the growth, in the nuclei of the cells which make up the growth, in the cytoplasm of hepatic cells, and within the endothelial cells of every organ. It is in the latter cells that the bacilli appear to be exceedingly numerous. All efforts to cultivate these organisms, both from the blood during life and from the blood and organs after death, have thus far proved unsuccessful, nor has any success attended the inoculation of animals with blood obtained from patients suffering from this disease.

[1] Archiv f. klinische Chirurgie, lxxxii, Nr. 18
[2] Hygiea, Stockholm, lxviii, No. 8   [3] Lancet, May 18, 1907

Benjamin and Sluka[1] have made a detailed study of forty-five cases of chloroma collected from the literature, together with the case of a boy, aged four years, which has just been reported by them. In all the cases tabulated they found that 50 per cent. occurred in children. In the cases of chloroma subjected to x-ray treatment the tumors retrogressed; but, even so, in the more severe acute cases the fatal termination could not be delayed.

EXOPHTHALMIC GOITRE.

Etiology. While there has been a large amount of literature upon the subject of Graves' disease during the past year, there have been but few important articles advancing any new ideas in regard to either the treatment or the pathology of the disease.

Sawyer[2] asserts that exophthalmic goitre as a name should be dropped, as "incomplete forms" occur so frequently without struma or goitre, and without exophthalmos. Many of these cases suffer especially from gastro-intestinal disturbances, to which more importance should be given, as so many symptoms seem to be hinged upon this condition, *i.e.*, loss of weight, glycosuria, thirst, constipation, diarrhea, salivary activity, skin pigmentation, etc. He also considers that a lymphocytosis of the large mononuclear variety is a symptom of this disease and that arsenic is harmful in these cases. In the cases which he observed he found all degrees of disturbed secretion, from achlorhydria to high hyperchlorhydria secretion of typical gastrosuccorrheal type, present. These patients, moreover, on repeated tests showed very variable composition of stomach contents as to both chemical and ferment activities.

According to Garnier,[3] the thyroid gland has two methods of secretion, an internal and an external. C. Bernard has shown that with its biligenic function it also possesses a glycogenic function, and he also establishes the existence of an internal secretion. Brown-Séquard elaborated this idea, and believes that each gland manufactures an external secretion which passes through the excretory channels directly into the blood. In addition to this he thinks that there is an internal secretion about which there is very little known. If this, then, is accepted, in addition to the colloid material manufactured by the thyroid gland there is also some other substance represented by the internal secretion. Garnier believes this explains the occurrence of certain cases of hyperthyroidism which do not correspond to a hypersecretion of colloid material, as well as the variations in Basedow's disease. It is indispensable, he thinks, in explaining the different varieties of insufficient thyroidism and their relation to goitre, and furthermore accounts for the possible co-existence of symptoms of hyperthyroidism with exophthal-

[1] Loc. cit.   [2] New York Medical Journal, July, 1907.
[3] Presse Médicale, December 12, 1906.

mic goitre. Washburn[1] states that the clinical features of exophthalmic goitre are not due to the same anatomical lesions in all cases, and in some no lesions other than hypertrophy of the thyroid gland can be found, and that this hypertrophy should be regarded as a consequence of the disease rather than as being the disease itself. At present there is no means of determining in a given case what, if any, anatomical lesions exist. From these facts, therefore, it follows that treatment in each case must be tentative. Many cases recover permanently, and these are most likely of toxemic origin.

A. A. Wilson[2] lays great stress on the family tendency and emotion in exophthalmic goitre, and thinks that we should be very skeptical as to the thyroid origin of the disease, as it may exist without goitre, and on examining the thyroid in these cases, it shows no abnormalities.

W. H. Thompson,[3] says that the thyroid enlargement is secondary, and that the poison is formed primarily in the alimentary canal and remains in circulation only after the thyroid loses its controlling power.

Remminger[4] reports a case of a Turkish soldier, aged twenty-nine years, who was suddenly attacked by an angry dog and was much upset by the encounter. Four or five days later he had a swelling of the thyroid gland, with suffocation and palpitations, pulse 140 to 160, generalized tremor, and all the symptoms of exophthalmic goitre under singularly rapid conditions He was of a phlegmatic temperament, and had no hereditary history of nervousness. Hysteria or neurasthenia was eliminated from the case, and the conclusion reached was that shock independent of any predisposition brought on the goitre.

Gierke[5] noticed, in the cadaver of a person who had died of exophthalmic goitre, that the thymus was enlarged. On reviewing the literature on the subject, he found that in forty other cases of exophthalmic goitre the thymus had been enlarged, and he himself observed a second case later. In one of his cases, in which the thymus was found to be from two to four times larger than normal, the patient died immediately after the removal of two-fifths of the left lobe. In both of his cases the exophthalmic goitre seemed to be unusually malignant, neither of the patients surviving longer than two or three years after the first symptoms. The majority of deaths after operations for exophthalmic goitre seem to occur in persons with persisting thymus. In 18 out of the 35 cases in which the record was complete was this true. In order to explain the facts which he has observed, Gierke believes that they suggest some connection between the goitre and the thymus gland, possibly some compensating function. This is all the more probable since Owen's experience with a patient whose exophthalmic goitre was greatly im-

[1] Wisconsin Medical Journal, March, 1907.
[2] Washington Medical Annals, September, 1907.
[3] Ibid. [4] Presse Médicale, November 14, 1906.
[5] Münch. med. Woch., liv, Nr. 16.

proved under what was supposed to be thyroid treatment. Some time afterward it was learned that the patient had, by mistake, taken thymus extract instead of thyroid extract. Mikulicz has also reported great benefit in exophthalmic goitre from the use of the thymus gland, especially in young patients with parenchymatous goitre. The thymus treatment has never been known to induce any by-effects.

Beebe[1] explains that the chemical studies of the gland have demonstrated three forms of proteid present—nucleoproteid, globulin, and albumin. The normal thyroid contains little nucleoproteid, much globulin, and smaller amounts of albumin. The parathyroid glands contain a large amount of nucleoproteid, a very small proportion of globulin, and still smaller amounts of albumin. In a number of exophthalmic cases he has found that the normal content is reversed and that the nucleoproteid exists very frequently in greater proportion than the globulin. Especially is this true in the fatal cases. Associated with this hypersecretion there is also found histological hypertrophy pointing back to hyperactivity of the gland, for which he advances the following reasons:

1. Result of nervous shock.
2. Compensatory hypertrophy during a toxemia.

In regard to the first there are many clinical evidences, or instances, of increased activity following shock. Why the effect should last beyond the stimulus may be explained by the formation of a new habit as a result of repeated stimuli, as is seen in other instances of physiological overwork. As to the second, there are many instances which point to a compensatory hyperplasia or hypertrophy, but at present there is no method of measuring this. It is not justifiable to say that there is no hyperthyreosis in those cases of exophthalmic goitre without thyroid enlargement.

Kocher[2] believes that the pathology as described by Halstead—hypertrophy of the gland and changed epithelium, etc.—is not restricted to exophthalmic goitre, as he has frequently found the same hypertrophic changes without any symptoms of Graves' disease. He does say, though, that in such cases the changes are found in a part of the gland or in a nodule where vascularization is diminished, while the diseased parts in the case of exophthalmic goitre are always in well vascularized parts of the glands.

Leuf[3] reports a case of a woman, aged about thirty years, who developed Graves' disease of a pronounced type after uterine curettement. She responded indifferently to treatment until potassium bromide was used, with a view to allaying the irritability of the nervous system. She improved rapidly after the treatment was changed to sodium salicylate.

---

[1] Journal of American Medical Association, October, 1907.
[2] Ibid., xlix, No. 15. [3] American Medicine, April, 1907.

It appears from the report of this case that shortly before the onset of her trouble the patient had suffered from a severe shock incident to the death, from accident, of her son.

Symptomatology.—Kraus,[1] in his review of the various *cardiac disturbances* which are apt to appear with goitre, thinks that the cardiac symptoms that are found in Graves' disease are probably due to the effect which the products generated in excess by the thyroid gland have upon the sympathetic system. The organism generally is flooded by these substances, which seem to have an affinity for the sympathetic nerves. In studying the severe primary cases and the milder secondary cases of exophthalmic goitre, he considers it important to learn whether dyspnea was an initial symptom or not. Enlargement of the heart, especially of the right side, suggests the secondary form. He does not agree with Moebius that the goitre disturbances form a chain which commences with simple and ends with exophthalmic goitre, but rather that the facts indicate a considerable degree of independence between the various goitre syndromes.

Sawyer[2] has noted among his large number of cases of Graves' disease that there is quite frequently a peculiar distribution of the *hair*. In many of these cases the eyebrows are scanty, sometimes throughout their extent, especially in the outer half of the brow. The lashes are scanty, and often there is a scarcity of hair in the axillæ and over the legs. The hair of the head, moreover, in many of these patients seems to be divided into two zones, and the lower and narrower zone, which runs around the lower edge of the growth of hair of the temporal and occipital regions, is apt to show a gray streak, sometimes a fringe of white, before change of color is noted in the upper zone. In younger patients this zone of hair is scanty. In a few cases has this peculiarity of pigment been reversed.

Walsh[3] has found in the literature 96 cases of *frontal band alopecia* reported. In 18 cases of exophthalmic goitre the congenital frontal band alopecia has been present. This band is often found in members of the same family and is hereditory. Walsh has found it in both adults and children, constantly associated with thyroid enlargements, tachycardia, nervousness, tremors, pigmentations, chilblains, etc., suggestive of Graves' disease. Possibly this band is associated with Graves' disease, or it may be trophoneurotic. It extends across the forehead hair line and often has no hair at all. At other times it has just a thin fringe of hair.

Mosse[4] reports a case of Graves' disease in which, though the disease has been greatly improved by treatment, Graefe's sign persisted on the

[1] Deut. med. Woch., xxxii, Nr. 47.
[2] New York Medical Journal, July 13, 1907.
[3] Lancet, October 19, 1907   [4] Berlin. klin. Woch , xliv, 1 to 28

right side, and on the left there was ptosis of the lid. In two other cases of exophthalmic goitre which he has observed, *glycosuria* was present.

Kocher[1] says that the *blood examination* in Graves' disease is very important. In nearly all typical cases there is a proportionately low polymorphonuclear count, and an associated actual or relative lymphocytosis. The lymphocytosis is in proportion to the severity of the disease, and if there is none, then the case is very serious. The lymphocytosis indicates a hyperfunction of the lymphoid tissue, which is a general condition, as there is a substitution of the myeloid leukocytes at the same time. He also thinks that the blood picture of a low polymorphonuclear count associated with lymphocytosis might account for the acute infections causing such great havoc in cases of exophthalmic goitre.

Barker[2] goes very carefully into the diagnosis and symptoms of exophthalmic goitre.

1. CHARACTER AND SIGNIFICANCE OF INDIVIDUAL SIGNS AND SYMPTOMS. (*a*) *The Struma or Goitre.* As a rule, the entire gland is enlarged, at first softer than normal, later on becoming firmer and more elastic. Nodulation of the surface to palpation due to lobular hyperplasia. Struma is always a vascular one, and is recognized by visible pulsation of tumor, palpable systolic expansion and thrill, and an audible bruit over the thyroid arteries.

(*b*) *Tachycardia or Pyknocardia.* The pulse rate is practically always over 90, at first only under psychic influences; later it is continuous.

(*c*) *Exophthalmos.* This is absent in one-third of the cases. It is distinguished from apparent exophthalmos by the shortening of the distance between the supra-orbital ridge and the anterior pole of the eyeball. This condition is usually bilateral and persistent, but it may be unilateral and vary from time to time.

(*d*) *Muscular Phenomenon.* Tremor is so frequently present as to be termed one of the four cardinal symptoms (Marie). It is rapid, eight to ten to a second, vibratory, and it usually affects the extremities.

(*e*) *Digestive Phenomena.* Diarrhea and vomiting are present.

(*f*) *Respiratory Phenomena.* These are dyspnea, lessened expansion of the thorax (Bryson's sign), air hunger, and often an odor due to acidosis.

(*g*) *Urogenital Phenomena.* There is incessant polyuria, albuminuria, glycosuria, increased urea, uric acid, nitrogen excretions.

(*h*) *Circulatory Phenomena.* These are pyknocardia, accidental systolic murmurs due to excited quickened heart action, dilatation, small, weak, radial pulse, arrhythmia, variable arterial pressure, throbbing abdominal aorta and carotids.

(*i*) *Nervous and Sensory.* These are exhibited in restlessness, irritability, anxiety, delirium, vertigo, hallucinations, insomnia, weakness, sense of heat.

[1] Journal of American Medical Association, xlix, No. 15.
[2] Ibid., October 12, 1907.

Eye Signs. The pupils are usually equal, but if the exophthalmos is unilateral, they are unequal. In the widening of the palpebral fissure there is (1) failure of the upper lid to follow the eyeball normally in looking down (von Graefe); (2) retraction of the upper lid on straightforward vision, revealing sclera (Stellwag); (3) incomplete or infrequent involuntary winking (Stellwag); (4) difficulty in holding eyes in convergence for any length of time (Moebius); (5) pigmentation of upper lid (Jellinek and Rosin); (6) failure of the forehead to wrinkle on looking up (Joffray); (7) epiphera; (8) tremor of eyeballs; (9) feeling of pressure behind the eyes; (10) abnormal dryness of eyes.

Skin. Abnormally smooth, delicate, thin, moist, with the sweating constant and troublesome. There is vasomotor instability and also blotchy erythema of skin.

(*k*) *General Metabolic Phenomena.* Increased oxidative processes.

2. DIAGNOSIS. The diagnosis, especially in the "formes frustes," or less obvious forms, is aided by the fact that the recumbent position accentuates the phenomena of hyperthyroidism, and therefore the patient feels worse in the morning.

3. DIFFERENTIAL DIAGNOSIS. (*a*) *Strumata.* In this condition there is not very acutely developing pulsating struma, as in exophthalmic goitre. When an exophthalmic struma is superimposed on a colloid struma, the symptoms are mitigated.

(*b*) *Goitre hearts* (mechanical) are to be separated from the thyreotoxic goitre hearts. This mechanical "goitre heart" is due (1) to struma extending through the superior aperture of the thorax (Kocher); (2) to mechanical injury of venous circulation (Rose's goitre heart); (3) to respiratory interference.

(*c*) *Exophthalmos* is to be differentiated from protrusion due to intracranial pressure, aneurysm, sinus thrombosis or abscess, retrobulbar growths, especially chloromatous masses.

(*d*) *Thyreotoxic pseudochlorosis* is characterized by protrusion of eyes in chlorotic-looking girls, where the blood is normal.

(*e*) Condition causing hyperthyreosis. Little is known of the underlying cause.

Early intelligent surgical interference is the best treatment.

Boston[1] describes a new sign which he has found in 15 cases of exophthalmic goitre after the exophthalmos had become conspicuous. The patient is seated with his occiput braced firmly against the back of the chair or wall and rotates the eye upward to the finger of the operator placed above the head. The patient is directed to follow the operator's hand with the eye as it is carried from above to below a level with the chin, the hand being kept about three feet distant from the eyes. In the course of the descent the following phenomena occur: the superior lid follows downward with the pupil for a short distance, where it rests

[1] New York Medical Journal, August 17, 1907.

for an instant, then displays a slight spasm, with an apparent slipping back, after which it continues to follow the pupil for an indefinite distance.

Treatment.   Little if any advance has been made during this year in the treatment of this disease.   Alexander[1] reports 13 cases treated with thyroidectin, a preparation derived from the blood of thyroidectomized animals, and which has been fully described in an earlier volume of PROGRESSIVE MEDICINE.   It is supposed to contain the metabolic poisons, unneutralized, which will nullify the toxic effect of excessive thyroid secretion.   In the 13 cases treated there was marked improvement in all but one.   The gland was reduced in size, the vascular and nervous symptoms were improved, and the fatigue and tired feeling were greatly benefited.   Alexander, therefore, believes that thyroidectin controls the characteristic symptoms of exophthalmic goitre.

According to Preble[2] the treatment of Graves' disease should be grouped under (1) plans directed toward the correction of the neurosis, which may or may not be causal, and (2) plans to counteract the perversion of the thyroid secretion.

To meet these indications he uses rest, which may be either absolute or partial, and a selected and if necessary forced diet.

In the way of drugs he uses iron and arsenic when there are associated blood conditions.   Iodides, he states, reduce the goitre but intensify the symptoms.   The cardiovascular drugs are used as may be indicated, but large doses tend to poison and small doses are useless.   The nervous symptoms should be treated with bromides and opium.   Thyroid preparations he considers harmful; and thymus, ovarian, testicular, and suprarenal extracts useless.

Clark[3] reports three cases treated with *rodagen*, which is milk from thyroidectomized goats.   In each case he noted slight improvement, but no more than has been seen in other cases under rest treatment.   In several cases treated with x-rays, however, he noticed marked improvement, the struma being greatly reduced in all and permanently in three.

Chapman[4] reports 4 cases of goitre—1 exophthalmic and 3 simple—which were greatly benefited by applying the high frequency current to the growth, the cervical spine, and the neck.

Rudinger[5] advises a single tentative exposure of the thyroid gland to the x-rays in every case of exophthalmic goitre.   The results may justify a continuance of this treatment, especially if the previously abnormally increased breaking down of albumin is replaced by a retention of nitrogen, as occurred in two of his cases.

[1] American Pract. and News, August, .1907.
[2] Journal of American Medical Association, October 12, 1907.
[3] Bristol Med. Chir. Journal, September, 1907.
[4] St. Louis Courier of Medicine, February, 1907.
[5] Deut. med Woch., xxxiii, Nr. 2.

Faber[1] used x-ray treatment in 8 cases of exophthalmic goitre with very remarkable results in a few instances, even allowing for a tendency to spontaneous recovery in some cases, and for the effects of suggestion in others. One patient, a married woman, aged twenty-five years, had had symptoms for four years, but they subsided, under seven applications of the x-rays for ten minutes, in the course of twelve days; the same treatment was repeated about a month later. Four months afterward she wrote that she had never felt so well.

Freund[2] reports 5 cases of exophthalmic goitre, all of which were greatly benefited by x-ray treatment. The thyroid gland was reduced in size, and as it decreased, the nervous symptoms also subsided, and in 2 cases systolic murmurs which were present disappeared. All of the patients increased in weight. In one of the patients, a young woman, the symptoms were first noticed about six months previously. After two months medical treatment she had shown no improvement and she was given two x-ray exposures, with an interval of a week between. After this the goitre rapidly subsided and no tremor or murmur could be detected. He thinks that the x-rays meet the causal indication by restoring normal conditions in the enlarged and morbidly secreting thyroid. A favorable influence seems to be exerted upon the nervous manifestations, the heart murmurs, the exophthalmos, and the goitre, especially when the last is soft and vascular. The more recent the goitre, the better seems the prognosis.

Miller[3] reviews 3 cases, all of which were cured by means of the x-rays and an iodine-free diet. Thyroidectin was tried in these cases without benefit. An interesting feature in connection with one of his cases was the fact that the patient gave birth to twins at the seventh month of gestation, and each child had a greatly enlarged thyroid gland.

Michalski[4] has observed a case of spontaneous recovery from Graves' disease. The affection came on suddenly and vanished in the course of a week or so. He advises change of air and serotherapy at first, supplemented possibly by hydrotherapy, electricity, psychic influences, and internal symptomatic medication. If this treatment fails to produce a beneficial change in the course of three or four weeks, he insists upon operative treatment.

Sawyer[5] has employed arsenic, iodides, bromides, and adrenalin in the treatment of Graves' disease, but considers such drugs of secondary value when contrasted with physical measures of environment, climate, hydrotherapy, electricity, and massage. Thyroidectin and antithyroidectin of Moebius he has used successfully in hundreds of cases.

Hildebrand[6] disapproves of the use of iodoform injections into a goitre.

[1] Hospitalstidende, Copenhagen, August 21, 1907.
[2] Münch med. Woch., liv, Nr. 17.   [3] Lancet-Clinic, Cincinnati, May 25, 1907
[4] Beiträge z. klin. Chir. v. Bruns, xlix. [5] Loc cit.
[6] Berl. klin. Woch., xliii, No. 51.

Though he admits that at times he has seen the goitre diminish in size following the use of the drug in this way, he has also noted a fatal result. He states that many cases do not improve by its use and must later submit to operation, when it is found that the injection has greatly increased the difficulties of the operation.

Milroy[1] reports an interesting case of Graves' disease following a miscarriage. The patient had had, for many years, a slight enlargement of the thyroid, but it had not increased for some time. She came under observation on account of an attack of dyspnea with an exceedingly rapid pulse, an increase in the size of the gland, and some slight degree of exophthalmos. This all grew rapidly worse, and resulted in interference with her nutrition, with consequent emaciation. She was given 3000 units of diphtheria antitoxin, and within a half-hour after receiving the injection she called for food, eating it and retaining it without difficulty. The diarrhea from which she had been suffering ceased immediately. Five days later the antitoxin was repeated, and again in four weeks, because of a mild recurrence of the gastro-intestinal symptoms. From the time of the first injection the patient improved steadily, gaining both in weight and strength, although the exophthalmos became more pronounced. The patient, however, remained more or less an invalid and about four months later a portion of the thyroid was removed.

Heineberg[2] reviews the literature of the serum treatment of Graves' disease with the following result: Ballet and Enriquez have obtained a serum from thyroidectomized dogs with tetany, and treated 9 cases with it, noting improvement in each case. Antithyroidin (Merck's) serum, from thyroidectomized sheep, gave good results in the hands of Kuh, Thienger, Lomer, and Alexander. Lanzo, Burghart, and Blumenthal used rodagen with improvement in their cases.

Beebe and Rogers inoculated rabbits with nucleoproteids and globulins from the thyroid of exophthalmic goitre cases, and with the resultant serum treated 10 cases, of which 3 were cured and 7 improved.

The greater part of the literature this year on the treatment of Graves' disease is from the surgical aspect, and most of the authors seem to be of the opinion that, if after using medical treatment for a short time there is no sign of any improvement, operative measures should be advised.

MYXEDEMA.

The most important contribution to this very interesting subject that has been made during the past year is by Howard.[3] By him myxedema

---

[1] Western Medical Record, September, 1907.

[2] American Medicine, June, 1907.

[3] Journal of American Medical Association, xlviii, 15, to 17.

is divided into three groups: cretinism, myxedema proper, and operative myxedema.

Abortive forms of myxedema occur, just as they do in exophthalmic goitre, to which the term "myxœdeme fuste" has been given by the French. This fact was first noted by Reverdin in 1886, in cases following a partial thyroidectomy, in which subsequently there was atrophy of the remainder of the gland. The loss of the outer half of the eyebrow is considered by the French to be almost pathognomonic of this type of the disease. There may be no mucinoid infiltration of the skin, but there is often a swelling and hypertrophy of the mucous membrane of the nose, throat, etc., sqme predisposition to enlarged tonsils and to the formation of adenoids. In women there is some tendency to circulatory disturbances of the mucous membranes at the menstrual period; and among other obscure manifestations of the disease are chronic constipation, paresthesia, and vague pains.

This author reports 10 cases of myxedema under the care of Dr. Osler between 1894 and 1904, and in addition analyzes 100 cases of myxedema which he has collected from the American literature from 1881 to 1905.

ETIOLOGY. The vast majority of cases occur in the white race, only one case in his series being reported in a negress.

The disease occurs most frequently in cold climates, and more frequently in Europe than on any other continent; 84 per cent. of this series were in native-born Americans, but they were widely distributed throughout this country, though apparently the disease was somewhat more prevalent in the northeastern districts.

Eighty-six per cent. of the cases were in women, mostly between the ages of thirty and sixty years; 13 per cent. were in men chiefly between the ages of thirty and fifty years. Social conditions play but a minor role as an etiological factor.

Unquestionably there seems to be a thyropathic tendency in certain families, so that the disease may be transmitted directly from either parent, but more commonly from the mother. Eight cases in Howard's series had a history of myxedema in the family; and it is possible that consanguinity in the parents may predispose to myxedema.

Alcohol and syphilis play little or no part in this disease. In women, myxedema bears some relation to the marital state, and out of 81 cases in which this point was noted, but 10 of the patients were unmarried. According to most authorities, repeated and rapid child bearing is an important predisposing factor. Mental shock and worry must also be considered as possible predisposing causes. The acute infections need not be considered unless they are followed by thyroiditis and atrophy of the gland.

Howard believes that a history of exophthalmic goitre preceding the onset of myxedema would be found more frequently, if careful inquiry

were made.   In three of his cases there was a definite history of Graves' disease preceding the onset of myxedema. ·

MORBID ANATOMY AND PATHOGENESIS.   The thyroid is diminished in size and becomes yellow or pale; occasionally the gland is increased in size, but in such cases it is functionally inactive.   A fibrous tissue invades and replaces the glandular structure.   There is a small-cell infiltration in the vesicle walls followed by an epithelial proliferation in the vesicles themselves.   Finally the gland becomes converted into a fibrous network, with clumps of round cells scattered through it. This process is analogous to that found in cirrhosis of the liver or the kidney.

Forsyth[1] reports the case of a woman who, antemortem, had every symptom of the disease.   After death autopsy showed that the thyroid was especially sclerotic.   The parathyroids showed a marked tendency for their cells to form vesicles lined with cubical epithelium.   There was an excessively profuse secretion of colloid which filled the follicles, lay among masses of cells, and descended the lymphatic channels.   There was also an abnormal increase in the connective tissue which formed coarse trabeculæ and penetrated between the cells, and the arterial walls were thickened.

Skin.   On making a section of the skin there is found a nuclear hyperplasia and an increase of connective tissue, especially in the neighborhood of the sweat and sebaceous glands and the hair follicles.   Nerves are generally unaffected, but usually there is an endarteritis of the cutaneous vessels.   The epithelium of the sweat and sebaceous glands becomes swollen, and the nuclei proliferate and the lumen of the tubule becomes closed.   The hair follicles are encroached upon by fibrous tissue, which causes atrophy of the roots, all of which accounts for the loss of hair and diminution of the secretion of sweat and sebum.

Nervous System.   Most writers ascribe the nervous symptoms to a padding of the peripheral nerve endings by myxedematous deposits, which interfere with the transmission of the afferent impulses, so that the central structures suffer by defective afferent conduction.   However, the most modern conception is the toxic theory.   According to this, there is an absence of the thyroid secretion, which either is itself essential to metabolism or neutralizes the otherwise toxic products of metabolism.

Heart.   The heart frequently shows some hypertrophy of the left ventricle with a slight fibrosis in the kidneys.   There is a remarkable discrepancy between the symptoms of cardiac insufficiency in myxedema and postmortem degeneration of the myocardium.

Kidneys.   In some cases the kidneys have been enlarged owing to the presence of large quantities of a transparent or faintly granular material which interferes with the renal tubules.

---

[1] British Medical Journal, vol. i, p. 141.

Chemical Analysis. A chemical analysis of the tissues shows an increase in the amount of the mucin in the skin, etc.; this excess results from the degeneration of the protoplasm of the epithelial cells and of the cells of the mucous membrane.

SYMPTOMATOLOGY. The onset is usually insidious, and some time may elapse before the symptoms are definite, so that it is difficult to determine the duration of the disease. In a few cases the symptoms develop rapidly. The first symptom usually is languor, and ordinary work becomes an effort; then a constant chilliness, or merely a sensitiveness to cold, may be noticed; finally slowness of motion and an increase in bulk make their appearance.

The edema is the most characteristic symptom and the one from which the name of the disease is derived. It is best developed in the loose cutaneous tissues and only very slightly where the skin is adherent to the underlying structures. It is solid and firm, it does not pit on pressure, and it is not affected by gravitation. The swelling is usually detected first in the face, but later it becomes generalized, with a constant increase in the size and the weight of the body. The edema may vary from time to time under different temperatures, being greater in cold weather than in warm.

There is a diminution in the mobility of the features, giving rise to a very characteristic facial expression, which may best be described as "heavy," "apathetic," "mask-like," "stolid," or "cretinoid." Ord says that "the total effect is that of a mask of sorrowful immobility." The effect of the edema of the face is so characteristic that, once seen, it will never be mistaken for anything else. In Howard's series there were 93 cases with the characteristic facies. On each side of the neck above the clavicles are large, soft projections of dough-like consistency. These are similar to the supraclavicular pads seen in cretinism. The hands are uniformly affected, being clumsy and "spade-like" (Gull). The feet and legs may be similarly affected. The extremities are usually cold, often purple and livid. The entire trunk may be the site of firm edema; in addition there may be localized areas of infiltration of considerable size.

The skin and its appendages show marked and characteristic changes, which increase as the disease progresses. The skin was abnormal in 99 per cent. of Howard's cases. It is usually dry and harsh to the touch, owing to the diminished activity of the glands. In fact, sweat was entirely absent in 27 per cent. of the cases. Desquamation often occurs either in the form of a dry powder or in larger flakes, or even in almost entire casts of the fingers or hands. The color of the skin is usually altered, it may be sallow, gray, or more often yellow, which may be deep enough to be mistaken for actual jaundice. Pigmented areas are not infrequent. Warts and moles are relatively common, and various forms of rashes occur. The usual indications of defective nutrition of the hair may be present, and the nails also show defective nutrition.

20

The teeth are frequently diseased.   In 86 per cent. of this series they were loose, brittle, and carious, or they had fallen out.   The mucous membrane of the mouth and lips is frequently swollen and pale, and is apt to be bitten while masticating.   The lips are often enlarged, everted, and pendulous, while the tongue is enlarged, swollen, and hypertrophic to such a degree as to interfere with speech.   The gums are frequently spongy and soft, and they recede from the teeth and bleed easily.   Often the saliva runs out of the corners of the mouth, giving the patient the facies of an idiot.

Owing to the fulness of the neck, it may be difficult to determine the size of the gland; in a number of cases, however, there is a distinct diminution of the size of the gland.   In 75.4 per cent. of this series the thyroid gland was either atrophied or not palpable, in three of these cases the gland was previously hypertrophied.

Next to the cutaneous comes the nervous system in degree of involvement; but it is a functional rather than an organic derangement.   This is chiefly characterized by a slowness in the execution of all the nervous functions.

Though the intelligence may be perfectly normal, in many cases there is a slowing of cerebration as to apprehension and thought.   A mental lethargy may be present so that the patient sits for hours in the same position, taking no interest in his surroundings and· showing no signs of mental or bodily activity.   In 38 per cent. of the cases the memory for recent events became impaired during the early stages.   Sleep is usually good; but in a few cases insomnia occurred.   Periods of placidity may alternate with periods of irritability.   Cases of myxedema are to be found in nearly every insane asylum, and such cases of insanity usually terminate in convulsions, coma, and death.

Abnormal subjective sensations are common.   In 96.7 per cent. of these cases there was chilliness.   It is often described as a sense of trickling of cold water on the skin, especially down the spine.   Various pains occur in the muscles and the joints.   Occipital headache is common. Patients are usually brighter and more comfortable in warm weather.

Objectively cutaneous sensibility suffers no actual loss.   Delayed sensation has been commonly noted, but allowance must be made for the mental hebetude present.   Anesthesia, hypesthesia, and hyperesthesia are also found in some cases.

Slowness of all the voluntary movements is most characteristic of the disease, and is rarely absent.   There is often a clumsiness and even actual ataxia (12 cases).   The gait is peculiar and almost characteristic, being of a waddling, shuffling, lumbering nature, well termed "hippopotamus-like" (Bramwell).   Paresis of the various muscles is common (34 cases).   Superficial reflexes are sometimes diminished, and in rare cases are absent.

Changes in the speech are very common, and were present in

97.2 per cent. of the author's series. Slowness is the most marked feature, but inarticulation may be present to a slight degree. Actual aphasia is rare. Speech is deliberate, hesitating, and monotonous, and there is an apparent difficulty in getting words out of the mouth, as they stick at the lips and are only enunciated with a visible contortion of the mouth and lips; yet, in spite of this, the patient is often garrulous. The timbre of the voice is hoarse, thick, or nasal.

Exophthalmos has been observed in the early stages, probably in association with a preëxisting Graves' disease. Neuroretinitis, optic atrophy, and dimness of vision have all been occasionally noted.

Hearing was impaired in 78 per cent. of the cases noted. In some cases it may be simply coincident, but in the majority it is due to the disease.

The sense of taste is often impaired, and perverted subjective sensations are also common. A bitter, acid, or metal-like taste may be present constantly.

The sense of smell is also sometimes impaired or perverted.

In the advanced stage of the disease the temperature is usually 1° to 3° F. below normal. In the early stages it may be normal or 1° or 2° F. above normal. In a well-defined case a temperature of 98° to 99° F. is an indication of fever.

There is nothing very distinctive about the pulse, though in the majority of cases it is slow and weak.

Blood pressure is apt to be low, and there is no special tendency to arteriosclerosis.

Early in the disease there is usually a mild secondary anemia. The hemoglobin is most often found to be 10 to 15 per cent. below normal. Leukocytes are usually actually as well as relatively normal.

Bleeding from the various mucous surfaces is one of the most common antecedents as well as a coincidence of the disease. It is usually from the uterus, nose, throat or gums. An unusual retardation in the process of healing in wounds of myxedematous subjects has been noted.

The appetite is usually good, though it may vary greatly. Diarrhea is not infrequent throughout the course of the disease; or constipation may alternate with or be followed by attacks of diarrhea.

Apart from dyspnea on exertion, there are no noteworthy symptoms in the respiratory system.

External genitalia in both sexes may be swollen and dry, and the pubic hair scanty. There is no great tendency to loss of sexual power, although there is a greater tendency to loss of sexual desire. Pregnancy may occur during the course of the disease, but it is not the rule, and severe postpartum hemorrhage is apt to occur.

In only 9 cases of Howard's series was the menstrual function normal, and in 7 cases the appearance of the disease was followed by the persistent absence of the menstrual function.

In the early stages of the disease the urine itself is normal. Later, there may be a diminution or an increase in the daily output, and the specific gravity is apt to be below normal. Albuminuria may occur in the later stages of the disease as a direct result of myxedema itself, or from an actual disease of the kidneys, when casts are usually present. The urea excretion is stated to be diminished.

In myxedema sugar is rarely found in the urine. Glycosuria, however, may develop in rare cases after the prolonged or excessive use of thyroid extract, when a condition of hyperthyroidea analogous to that of exophthalmic goitre may occur.

Roy[1] points out some of the *symptoms common to both myxedema* and *exophthalmic goitre*. Both diseases, he says, are almost wholly a woman's disease. Both are neurotic diseases. Patients suffering from either say that their heads do not feel just right. Both diseases have skin changes, loss of hair, vitiligo, scleroderma. Vertigo is also common, as is hysteria, muscular weakness, dyspnea, edema, a tendency to hemorrhage, and a fine tremor.

DIAGNOSIS. The diagnosis of myxedema can almost be made at a glance, the clinical picture being pathognomonic.

If the condition is thought to be one of *obesity*, the therapeutic test—the administration of the thyroid extract—may be used.

In chronic *nephritis* the edema is in the dependent portions of the body and is determined by gravitation, or it appears where the tissues are loose, and it pits markedly on pressure. The complexion is pale, in striking contrast to the hectic flush of myxedema. The urine always shows signs of more or less serious renal disorder.

Trophedema or "dystrophie edémateuse" may be more difficult. This is characterized by a white, firm, painless edema occupying one or more segments of one or both of the upper or lower limbs, persisting without appreciable prejudice to health throughout life. It is probably of nervous origin, and is analogous to muscular dystrophy.

Adiposis dolorosa can be distinguished by the presence of large irregularly distributed, fatty tumors, which are painful and very tender; secondly, by the sensitiveness of the nerve trunks; and lastly, by the reaction of degeneration on electrical stimulation of the muscles. The absence of sweat, the headache, and the mental changes, however, closely simulate myxedema.

THE COURSE OF THE DISEASE is generally slow and progressive, often lasting for years. In Howard's series the average course was five years and nine months. Sometimes, even in the absence of thyroid treatment, periods of improvement occur, suggesting an arrest of the disease.

In some cases death is the direct result of the myxedema from general physical or nervous exhaustion, severe anemia, coma, or mania. The

[1] Washington Medical Annals, September, 1907.

majority of patients, however, die from some intercurrent affection, such as tuberculosis, pneumonia, or nephritis.

TREATMENT. Maintenance of the body warmth is important in the treatment, and is best secured by moving to a warm climate. The bowels must be regulated and a good nutritious diet provided.

Thyroid Therapy. The ideal treatment is to transplant thyroid tissue and get it to functionate, but this is not always successful, and therefore the thyroid gland from a sheep, usually given as the dry extract in pill or powder, is the most efficacious. •

At first there must be determined the most suitable constant daily dose of the drug. This can be done only by trial, and must be determined for the individual case. It is best to begin with a small dose (2 grains of the extract) once a day and gradually increase in frequency and amount until the symptoms begin to subside. This stage of the treatment should be carried out with great care. Any undue acceleration of the pulse, as an increase of from ten to twenty beats a minute, indicates overdosage. A rise in temperature of 1° above normal and vomiting or purging are also danger signals of thyroid poisoning. Extreme prostration, headache, sweating, and irritability are some of the other indications of the toxic effect of the drug, which in many ways are remarkably similar to the toxic symptoms of exophthalmic goitre in which the patient has a condition of hyperthyroidism.

The first noticeable effect is the rising of the body temperature to normal. Next there is a gradual or even a sudden diminution of the subcutaneous edema, with a consequent loss in body weight. There is also a restoration of the secretion of the skin, which becomes moist and soft, losing its hard, dry, roughened character. The hair begins to grow as a fine, thick crop. The menses return to their normal regularity and quantity. The urine is sometimes considerably increased, and the albuminuria and casts disappear. The anemia may not clear up; it may be increased and be accompanied by the appearance of a true edema of the feet. Both of these symptoms usually disappear in a few weeks, when the patient gains his normal strength. With the physical improvement there is a corresponding improvement in the mental and nervous symptoms. In some cases actual insanity has been cured.

Soper[1] reports a case of *cretinism* of eight years' standing in a child. The symptoms were typical of the disease, and he began treatment by giving at first one-half of a two-grain tablet three times a day. In one week the amount was increased to a full tablet three times a day, and at the end of two weeks five tablets a day were given. This treatment was kept up for several months. The result in this case, during the four months that the child had been under treatment, has been remarkable. The thyroid medication was pushed more than usual, and

[1] Journal of American Medical Association, xlix, No. 20.

Soper combated the untoward symptoms with digitalis and mild nerve sedatives.

Edwards[1] mentions a case of a cretin, aged eight years, who under the use of thyroid extract made remarkable physical improvement, but who showed little if any mental improvement.

PROGNOSIS.　　In cases that have had no treatment the prognosis is most unfavorable.　Since the introduction of thyroid therapy, however, if treatment is commenced early and if there are no complications, life should not be shortened.　In severe cases of long duration, in which the stages of shrinking in the gland is far advanced, the outlook is not so good.　Advanced cardiac or arterial degeneration is a source of great danger, and thyroid treatment in such cases has been followed by death.

PARATHYROIDS.

The parathyroids have occupied a considerable place in the literature during the past year, but on account of their close relationship to the surgery of the thyroid gland, they have been discussed more from a surgical than from a medical standpoint.

Forsythe,[2] in summarizing his views, says:

1. The parathyroid gland, like other glands, presents the histological variations of activity and rest.　The so-called oxyphile cells are cells distended with granular secretion, and the so-called principal cells represent the exhausted stage.　Intermediate forms are common.

2. The granular secretion of the cells is extended into the surrounding lymphatic spaces, and often the product of many cells run together to form a drop.　This may either lie in an irregular space between the cells or occupy a central position around which the cells are grouped to form a vesicle.　In either case the secretion passes into the smaller lymphatic vessels and gradually flows along larger vessels to reach the surface, whence it drains away from the gland.

3. The secretion of the parathyroid, both in its physical character and in its microchemical reactions, appears indistinguishable from the colloid of the thyroid.

4. During the first few months of life the parathyroid glands show few if any signs of activity.　By the end of the third month, at the latest, colloid secretion may be found, though the infantile type may persist for some years.

Segale[3] says that after parathyroidectomy such profound disturbances of the metabolism occurs that all efforts on the part of the organism to repair it are absolutely ineffectual.　The old idea of cachexia strumi-

---

[1] Northwestern Lancet, August, 1907.
[2] British Medical Journal, May 18, 1907.
[3] Archivio per le Scienze Mediche, Turin, xxx, No. 3.

priva is based on solid foundations, he thinks, and means more than ever before, only the disturbances are not due to the extirpation of the thyroid, but rather to the parathyroidectomy done at the same time. The symptomatology is the same whether the parathyroids alone or the parathyroids and the thyroid are extirpated. True cachexia strumipriva kills in fifteen or sixteen days, incidentally by tetany perhaps, but in reality by the intense disturbance of the metabolism resulting from lack of the parathyroid function.

Schirmer[1] reviews one hundred and eighty-seven articles which have been written concerning the parathyroids. From these articles logical conclusion drawn from the assumption of an internal secretion and toxin neutralizing function on the part of the parathyroids, is to treat conditions due to defective functioning of these glands by a specific antitoxin or organotherapy. In experimental research, and in some of the large clinics abroad, favorable results have been reported from the use of emulsions, etc., of the parathyroids.

Study of the internal secretion is needed, and also the determination of the minimal amount of parathyroid tissue necessary to maintain the normal balance.

The role of the parathyroids in postoperative tetany seems to be established now beyond question, but it is still dubious in regard to other forms of tetany, eclampsia, and myxedema.

The greatest problem in the parathyroid treatment is whether it should be by antitoxin or organotherapy.

Erdheim,[2] in his article on experimental *tetany*, says that it used to be thought that a complete thyroidectomy would produce tetany in a carnivorous animal and cachexia in an herbivorous one; but if the parathyroids are removed, it is now known that tetany is also produced in the herbivorous animals. In order to prove that it was the thyroid that was instrumental in causing tetany, it was argued that if the thyroid were completely removed and transplanted into some other organ the animal did well, but if later this transplanted thyroid were removed, tetany would follow. Now we know that it was because a parathyroid was transplanted with it and was able to perform its functions under the new conditions. It was formerly thought necessary, in order to avoid tetany, to leave at least one-eighth of the thyroid gland; now we know that it depends entirely upon how many parathyroid bodies remain.

Thompson[3] reports a research concerning the condition of the parathyroid in a case of *primary infantile atrophy*. He states that in this condition the parathyroid glandules show changes which may be degenerative in type, but which are for the most part progressive, and consist of the replacement of a varying amount of the gland parenchyma by connec-

[1] Centralblalt f. d. Grenzgeb. der Med. und. Chir., x, Nr. 13.
[2] Mitteilungen a. d. Grenzgeb. der Med. und Chir., xvi, Nrs. 4 to 5.
[3] American Journal of Medical Sciences, 1907

tive-tissue stroma. These changes are similar in nature to those which are constantly present in other ductless glands, and become especially apparent in long-standing cases of the disease, as evidenced in the extreme atrophy of the thyroid and medullary suprarenal in the cases here described. He does not imply that these various glands are primarily at fault in infantile atrophy, but rather emphasizes the fact that failures of assimilation in this disease lead to wider changes than simple wasting of fat and muscle.

Thompson[1] states that there was no alteration demonstrable by morphological methods in the parathyroids of nine cases of *paralysis agitans* studied by him; and he believes that there is no anatomical basis for the hypothesis that paralysis agitans is a chronic progressive hypoparathyroidism.

ADDISON'S DISEASE.

The importance of the early recognition of the site of the affected tissues and the nature of the morbid process attacking the organ in Addison's disease, according to Grünbaum,[2] has been accentuated by the recent progress in the treatment of disease.

He defines Addison's disease as a condition which gives rise to a definite series of signs and symptoms, and, in the majority of cases, marked lesions of the medulla of the suprarenal gland are found at autopsy. In some apparently typical cases these glands prove to be healthy, not only upon macroscopic and microscopic examination, but also when the potency of their extract is tested physiologically. Frequently in these cases disease of the solar plexus can be demonstrated, and the explanation of the observation may lie in the fact that the internal secretion of the medulla of the suprarenal gland acts by stimulating the sympathetic system, for it is quite comprehensible that the effects of destruction of the sympathetic system, or of the producer of the activator of that system, will lead to identical symptoms, and therefore the two conditions will resemble one another very closely. Along with the sympathetic nerves in the abdomen, in some immature animals, is a series of cells which have been termed chromaffin cells, because they yield a yellow color on treatment with chromic acid. The intensity of the color developed is said to bear a definite direct relation to the activity of the extract prepared from the tissue, and the effect, following the injection of the extract, cannot be distinguished from that produced by the injection of an extract of the medulla of the suprarenal gland.

As the explanation of those cases in which the signs of suprarenal inadequacy have been absent, in spite of the gland's having been completely destroyed by disease, Grünbaum suggests that it is the assump-

---

[1] Journal of Medical Research, December, 1906.

[2] The Practitioner, August, 1907.

tion of the duties of the suprarenal gland by the chromaffin cells in the same manner as the parathyroid glands take over the functions of the thyroid gland after its extirpation.

Pathology. That the suprarenal glands are diseased in this condition is definitely determined, but the nature of the morbid process taking place in them is not yet definitely decided. Grünbaum[1] found the most common lesion to be tuberculosis, but in one of his cases some other undetermined condition existed.

Scheult[2] reports a case of the disease in a negress in whom the suprarenals were the seat of the tuberculous caseation, and in all three of Stursberg's[3] cases tuberculosis of the suprarenals were found.

To assist in determining the presence of the tuberculous infection, the opsonic index has been used with the same result as all opsonin investigation—great variability in the hands of different workers. According to Grünbaum[4] the most trustworthy method is by noting the opsonic index, and then determining, by repeated examinations, the duration of the negative phase which follows an injection of $\frac{1}{500}$ mg. of tuberculin. In normal individuals the negative phase is short, twenty-four hours or less, while in tuberculous subjects it is prolonged, and may be even for a period of three weeks.

Diagnosis. Grünbaum emphasizes the importance of endeavoring to diagnosticate the disease early because of the future possibility of applying to man the methods of transplantation which have been used with such success upon animals by Guthrie and Carvel. If such a treatment is to be successful, tissue similar to the graft must be already in the animal, but if the normal tissue is destroyed by advanced disease before the graft is made, the transplanted tissue is absorbed and cannot take over the function of the normal organ. This author speaks of the pathognomic signs and symptoms of Addison's disease as being asthenia, pigmentation, vomiting, and attacks of faintness.

Pigmentation, the most obvious sign of the disease, he considers far from the most pathognomonic, since he has seen some cases of Addison's disease which did not develop pigment, while development of pigment occurs in many other conditions.

Stursberg[5] also emphasizes this fact in reporting three cases of tuberculosis of the suprarenals in which there was no pigmentation; and Zinniger[6] reports a case terminating fatally, which at no time showed pigmentation, although all other symptoms of the disease were present. Pigmentation of parts subjected to light or irritation, such as the face and hands, the axillæ and groins, where the shoulder straps or braces cross the shoulders, or the garters encircle the legs, which do not yield to repeated applications of soap and water; pigmentation of the

---

[1] Loc. cit.   [2] Lancet, August 3, 1907.
[3] Munch. med. Woch., April 16, 1907.   [4] Loc. cit.
[5] Loc. cit   [6] Ohio State Medical Journal, March, 1907.

mucous membrane, at one time considered of exceptional diagnostic value, are all suggestive, but according to Grünbaum they are not necessarily pathognomonic.

He points out the conditions which must not be confused with the pigmentation due to suprarenal insufficiency: 1. The pigmentation accompanying pregnancy. (2) The increased pigment occurring in chronic tuberculosis. (3) Vagabond's disease, in which the skin becomes dark from continued irritation. (4) Von Recklinghausen's disease. (5) Hemochromatosis. (6) Exophthalmic goitre. (7) Pigmentation due to the prolonged ingestion of arsenic. (8) Argyria. (9) The darkening of the arms and upper part of the body in men exposed to heat, such as occurs among stokers. (10) The pigmentation arising among workers in some chemical factories, especially those engaged upon anthracens compounds. (11) Melanasma accompanying melanotic sarcoma. (12) Freckles, similar in some respects to Kaposi's disease.

The pigmentation associated with pregnancy, he states, is usually of but recent date, but may be accompanied by vomiting and languor, which makes definite exclusion of Addison's disease by the usual methods difficult.

The increase of pigment in advanced cases of tuberculosis is usually more uniform than in Addison's disease, but in a certain number of cases, the adrenal glands becoming affected, it may be impossible to distinguish it from the ordinary typical disease.

Vagabond's disease usually permits of ocular demonstration of the cause of irritation, on the removal of which the pigmentation fades.

Von Recklinghausen's disease presents varying aspects, but upon minute examination the other skin alterations and the neurofibromata can be detected.

The nature of pigmentation in exophthalmic goitre is very similar to that of Addison's disease, but the associated symptoms permit of the differential diagnosis.

Pigmentation due to arsenic, in Grünbaum's experience, simulates most closely that of suprarenal disease.

Argyria presents a very different color to that in the pigmentation in Addison's disease.

In melanasma, the pigmentation is usually uniform; and in the majority of cases the primary lesion can be found.

Kaposi's disease in its typical form leads to the development of epitheliomata, but there seems to be a number of varieties of different malignancy. Grünbaum mentions a case in which the crop of freckles was so numerous as to produce a dark-brown color to the face which resembled an advanced case of Addison's disease, while the pigmentation of the mouth resembled that of melanotic sarcoma.

Asthenia is the most common early symptom, but unfortunately it is not confined to Addison's disease. The rapid fatiguing of the muscles

is occasionally sufficiently well marked to be pathognomonic, while in less-pronounced cases graphic record may assist. However, Grünbaum has not found the ergograph method of diagnosticating Addison's disease to be very satisfactory.

Remarkable weakness in a patient, in stong contrast to a well-nourished aspect, is undoubtedly an important sign. Stursberg[1] made the diagnosis in two of the three patients without pigmentation (mentioned above) because of this symptom.

The alteration in *blood pressure* is, in Grünbaum's opinion, of great importance in assisting in the diagnosis of this disease; but in order to be of any value the test must be made with great accuracy. He recommends the Hill and Bernard sphygmomanometer with a mercury or simple air manometer. He depends for his records upon the systolic, and does not consider the diastolic pressure essential for this special diagnostic purpose. He found the systolic pressure low in Addison's disease, usually less than 100 mm. Hg.; in one case as low as 67 mm. Hg. It is his rule to take the blood pressure on at least three occasions in all cases suspected of suprarenal inadequacy, and if the blood pressure is low, suprarenal extract is administered by the mouth. In many cases this is followed by a distinct rise in the pressure. These cases later prove to be Addison's disease. This rise in pressure is not seen in normal individuals when suprarenal extract is administered by the mouth. In those cases in which pigmentation occurred from other reasons the blood pressure was not raised on administration of the drug.

Grünbaum considers that his results have been sufficiently constant to permit him to base a diagnosis upon the following method:

The blood pressure is estimated upon three occasions, and the heart is examined to determine whether there is any valvular lesion. If the pressure is low and there is no valvular lesion, a trustworthy extract of suprarenal gland is administered three times a day, in doses of three grains, for three days. The blood pressure is then estimated again, and if there is a rise of more than 10 per cent., the probability that the patient is suffering from adrenal insufficiency approaches a certainty. For three days preceding the first observation no other drugs should be administered. Not infrequently a patient with a low pressure does not react to suprarenal gland, but does to strychnine; this, if of value at all, is additional evidence against the probability of the disease being Addison's.

Stursberg[2] also emphasizes the importance of a low blood pressure, not to be explained by any disturbances on the part of the heart.

Changes in the *blood* are doubtful, according to Grünbaum. The hemoglobin often remains of normal quantity, and the number of erythrocytes is not diminished. In a few cases the leukocytes have been

---

[1] Loc cit.   [2] Loc. cit.

increased in number, in the form of a lymphocytosis, but the author points out that it is doubtful whether these were uncomplicated cases.

Gastro-intestinal disturbances without traceable cause are corroborative evidence of the existence of Addison's disease according to Stursberg[1] and Grawitz.[2] The latter also believes that the treatment of such disturbances accomplishes much toward controlling the general condition. He reports a case to emphasize this point. When the patient was first seen, the adynamia was so marked that an unfavorable prognosis was made. Owing to the secretory and motor insufficiency of the stomach, gastric lavage with salt solution was practised. In the way of medical agents nothing but hydrochloric acid and nutrient enemata were given. The patient gained slowly in strength and weight, the skin pigmentation lessening, but never entirely disappearing. Since 1903 the patient has improved steadily, and Grawitz believes that the man may be considered cured. He considers the indication for such treatment to be gastro-intestinal toxemia, which is not purely the effect of the disease of the adrenals, but may have even a causative agency in producing the general constitutional symptoms.

[1] Loc. cit.   [2] Deutsch. med. Woch., July 4, 1907.

OPHTHALMOLOGY.

By EDWARD JACKSON, M.D.

DISEASES OF THE CONJUNCTIVA.

The Ophthalmo Reaction. The reaction produced by instilling a special preparation of *tuberculin* into the conjunctiva, discovered by Calmette,[1] and often called "Calmette's reaction," is important both as a test of the presence of tuberculosis, and as an addition to our knowledge of the mode by which the body resists a specific poison.

From cultures of the tubercle bacillus Calmette obtained an alcoholic precipitate. One part of this precipitate was dissolved in one hundred parts of distilled water; and a single drop of this "solution" placed in the conjunctival sac. A solution of one-half this strength answers equally well for a large proportion of cases; and is less likely to produce an excessive reaction. Calmette warned against the use of glycerin preparations, thinking the irritation caused by the glycerin might be confused with the reaction. But even pure glycerin placed in the conjunctival sac causes only a slight irritation, which passes off long before the time for the appearance of the specific reaction. Some of the glycerin preparations of tuberculin, however, will not produce the specific reaction even when used in full strength.

In the eye of a normal person the instillation of Calmette's solution causes no irritation and no after-effect. In a person suffering from tuberculosis, or who has previously had tuberculosis, the instillation at first causes no more irritation than in the normal eye, but after several hours, most frequently about eight, sometimes as early as three, or as late as twenty-four, there occur smarting and burning, with redness of the conjunctiva, hyperemia of the deeper vessels, and swelling of the caruncle and semilunar fold. These conditions constitute a slight reaction. The hyperemia is most pronounced at the point where the drop of solution was placed, and more noticeable in the lower cul-de-sac, but the redness may extend to the whole conjunctiva. The lids become swollen and there is slight mucopurulent or fibrinous discharge. This is counted a moderate reaction. If this swelling of the conjunctiva is great and the discharge profuse, the reaction is severe.

The reaction usually reaches its height in the first twenty-four hours, and then subsides in the course of two to seven days. It may, however,

---

[1] Gaz. des Hôpitaux, June 25, 1907

be followed by prolonged hyperemia, or follicular conjunctivitis. In one of Stephenson's[1] cases this lasted more than a month. In a case of my own the reaction proper continued two weeks. The reaction is accompanied with some burning and sense of irritation; but the discomfort is quite slight, compared with the objective symptoms. The reaction differs totally from that produced by dionin, as pointed out by Truc and Maillet;[2] and one familiar with ocular disease will quickly recognize that the appearances presented differ notably from any ordinary inflammation.

Where the eye submitted to the test had been healthy, no unfavorable effect has been reported, other than the prolonged hyperemia, etc. But eyes already the seat of disease, presumably tuberculous, seem sometimes to have their condition aggravated by the application of the tuberculin solution. Kalt[3] reported such a case; and de Lapersonne[4] met with six cases in which a form of ulcerovascular keratitis supervened; but in no case is it clear that the damage done was permanent.

The general diagnostic value of the test is properly to be considered in another department. With reference to ocular lesions it is not known to have any peculiar value. It simply indicates that tuberculosis has been existent somewhere within the body.

Ophthalmo Reaction of Typhoid Fever. Chantemesse[5] has demonstrated in persons suffering from typhoid fever, or recently convalescent from it, an ophthalmic reaction similar to that obtained in tuberculosis. He uses an alcoholic precipitate from cultures of the typhoid bacillus, which precipitate is dissolved in distilled water. An amount of the solution containing $\frac{1}{50}$ milligram of the precipitate provokes the reaction. Two or three hours after it is instilled into the conjunctival sac reddening, lacrymation, swelling, and sometimes serofibrinous discharge appear. In four or five hours these symptoms have subsided. He believes that the reaction will assist in the diagnosis of typhoid, at an earlier period than the Widal test. In rabbits inoculated with typhoid cultures he has obtained it within forty-eight hours. Trials in persons not affected with typhoid seem to confirm the specific character of the reaction. But it is of interest to note that Cohn,[6] trying the tuberculin test upon the conjunctiva in typhoid fever patients, obtained a reaction in 8 out of 12 cases. This he ascribes to hypersensitiveness to toxalbumins in general.

Bacteriology of Conjunctivitis. The presence of bactericidal substances in the conjunctival secretion has been the subject of investi-

---

[1] Ophthalmoscope, December, 1907.
[2] Rev. Gén. d'Opht., November, 1907.
[3] Recueil d'Optalmologie, October, 1907, p 595
[4] Presse Médicale, December 7, 1907.
[5] Bulletin de l'Académie Méd., July 23, 1907.
[6] Berliner klin. Wochenschrift, November 27, 1907.

gation by zur Nedden.[1] He found the secretion of the normal conjunctiva produced no effect, but secretion obtained in cases of acute conjunctivitis was actively bactericidal, and inhibited the growth of typhoid and dysentery bacilli and the diplobacillus of Morax and Axenfeld.

Cases of conjunctivitis from gonococcal, Koch-Weeks, and diplobacillus infections manifested no specific difference in the bactericidal properties of the secretion. As the inflammation subsided the action of the discharges became progressively weaker, and the discharge from subacute cases was notably less active. In general the bactericidal efficiency of the conjunctival discharge was less than that of the blood serum of the same individual.

Zur Nedden thinks that astringents applied to the conjunctiva have comparatively little value as direct antiseptics. But through the hyperemia they provoke they favor the escape of bactericidal substances into the conjunctival secretion, and thus combat infection.

THE DEVELOPMENT OF BACTERIA IN THE CONJUNCTIVA, UNDER THE PROTECTIVE BANDAGE, has been studied by Napp.[2] He finds that under the bandage the numbers of bacteria, both pathogenic and non-pathogenic generally increase. But where this occurs after operation and the closure of the wound the healing is not interfered with. In a few cases the conjunctiva appears to remain sterile.

What he calls his *Therapeutic Serum* has been exploited by Deutschemann,[3] for the treatment of conjunctival infections and those involving the deeper structures of the eye. He obtains it from rabbits that have been fed for eight days upon dried yeast. The results reported from its use do not support any very high estimate of its therapeutic value.

A case is reported by Tertsch,[4] in which a *membranous formation* in the conjunctiva and cornea was found to consist largely of pseudodiphtheritic or xerosis bacilli. There was very little hyperemia or irritation.

A *new pathogenic bacillus* causing conjunctivitis has been described by McKee.[5] It resembles somewhat the influenza bacillus. But its growth on agar is hardly perceptible. It can be cultivated on media free from hemoglobin; and it is viable for a much longer period than the influenza bacillus. It is pathogenic for mice. From a series of 9 cases McKee concludes that it causes a conjunctivitis different from that of influenza. The palpebral portion of the conjunctiva is very hyperemic, and there is profuse mucopurulent discharge. But there is not the redness of the eyeball noticed in acute contagious (Koch-Weeks bacillus) conjunctivitis. Numerous statistical papers upon the bacteriology of

[1] Zeitschrift f. Augenheilkunde, October, 1907.
[2] Ibid., September, 1907.
[3] Münchener med. Wochenschrift, 1907, Nr. 19.
[4] Beiträge z. Augenheilk., Heft 68, 1907.
[5] Ophthalmic Record, October, 1907.

conjunctivitis have appeared during the past year. In the main they confirm previous observations.[1]

GONORRHEAL CONJUNCTIVITIS. Two cases of metastatic conjunctivitis are reported by Carrol.[2] They occurred in the course of gonorrhea; but repeated bacteriological examinations of the conjunctival secretion failed to show gonococci, although they were numerous in the urethral discharge. Carrol, from a study of the literature on the subject, finds the most plausible hypothesis to be that of a toxin of the gonococcus, reaching and acting on the ocular mucous membrane. The discussion of Carrol's paper brought out reports of a few additional cases, and made it evident that the condition is rare, ophthalmologists of large experience having not encountered it. Its striking characteristic is the small amount of secretion as compared with the hyperemia and swelling of the conjunctiva.

GONORRHEAL ARTHRITIS COMPLICATING OPHTHALMIA NEONATORUM is a rare condition, but one that is important to recognize. Cases have been previously reported.[3] One is now placed on record by Nunn.[4] It terminated in recovery.

In a very careful study of the *etiology of ophthalmia neonatorum*, based on 100 cases, Wharton[5] found the gonococcus in 75; pneumococcus, 5; staphylococcus, 3; Koch-Weeks bacillus, 1; and no bacteria in 16, of which 8 were cases of purulent discharge. Of the mothers of infants suffering from gonorrheal ophthalmia, 91 per cent. had "suffered from some pelvic mischief," and 56.8 per cent. had vaginitis, with gonococci in the discharge. Of 8 mothers examined, who were said to be healthy, 3 were normal; 3 yielded gonococci; 1 had pelvic cellulitis; and 1 a pelvic discharge, not examined for organisms. In the largest number of cases (29) the disease developed on the third day. In 6 it was present at birth.

Antepartum ophthalmia neonatorum was referred to last year.[6] Additional cases have been reported by Nance,[7] Robinson, and Ford,[8] six in all. The conclusion of the latter, that infection may occur through the unruptured membranes, is strikingly confirmed in a case reported by A. Terson.[9] A child, delivered by Cesarean section, presented eyes that were red, swollen, and discharging, when removed from the uterus. The case ran the course of a severe purulent conjunctivitis,

[1] PROGRESSIVE MEDICINE, June, 1906 and 1907.
[2] Trans. Section on Ophth., American Medical Association, 1907.
[3] PROGRESSIVE MEDICINE, June, 1906.
[4] Lancet, September 14, 1907.
[5] Ophthalmic Review, November, 1907.
[6] PROGRESSIVE MEDICINE, June, 1907.
[7] Journal of Ophthalmology and Oto-Laryngology, April, 1907.
[8] Ophthalmoscope, May and June, 1907.
[9] Annales d'Oculistique, July, 1907.

ending in recovery. The bacteriological examination showed, with staphylococci, diplococci, often in groups of fours, but which took the Gram stain well. In this case there was no suppuration of the lacrymal sac.

In the treatment of purulent conjunctivitis the *relative value of the different silver salts* is still under debate. De Schweinitz[1] concludes, from his five years' experience, that the enthusiastic claims made for the organic salts have not been sustained. Protargol, he thinks, might be discarded; and while argyrol is sometimes useful, because it is non-irritant and less likely to do harm if unskilfully used, he would not rely on it to the abandonment of silver nitrate. Kelly[2] also finds the nitrate superior to the organic salts of silver; and an efficient bactericidal agent. The irrigation of the eye with potassium permanganate solution, 1 to 5000 to 1 to 3000, is held in high esteem by de Schweinitz; and its advantages are urged by Davids,[3] writing from the Göttingen Clinic, where it has been used in solution of 1 to 15,000 with advantage. Even the stronger solutions mentioned cause neither pain nor irritation.

Trachoma. The *transmission of trachoma* to the ape and the observation that the virus would not pass through a Berkefeld filter were reported in 1905 to the Heidelberg Congress by Hess and Römer. Their statements then attracted little attention. However, Bajardi[4] now reports that he has fully confirmed their observations. Nicolle and Cuenod[5] have successfully inoculated the macacus sinicus. Halberstädter and Prowazek[6] experimenting on the ourang-outang and other monkeys in Java, report the transmission of the disease from man to monkey, and also from one monkey to another.

They also observed in all cases the presence of minute bodies, intracellular, adjoining the nuclei. These appear to undergo development, so that they occupy a larger part of the cell body, and are also found outside the cells. On account of the peculiar arrangement of these minute bodies about the nucleus, the name "chlamydozoen" (cloak animals) was suggested. This organism has also been found by Greeff, Frosch, and Clausen,[7] both in the cells and in the secretion. These writers, however, prefer the name "trachoma corpuscles," believing that the bodies may be minute cocci or bacilli. They are smaller than any coccus or bacillus previously recognized; are found in pairs; and they have been stained by the methods used for spirochetæ, and also by various aniline dyes by methods used for the tubercle bacillus, but not by Gram.

---

[1] Therapeutic Gazette, January, 1907.
[2] British Medical Journal, November 23, 1907.
[3] Klinische Monatsblätter f. Augenheilkunde, August and September, 1907.
[4] Ophthalmic Review, June, 1907, p. 161.
[5] Annales d'Oculistique, July, 1907, p. 35.
[6] Deutsche med. Wochenschrift, August 1, 1907.
[7] Archiv f. Augenheilkunde, February, 1908.

It is to be noted that the struggle against trachoma is becoming active in many countries, with a corresponding increase in the literature pertaining to it.

Cysts of the Conjunctiva. These, according to Cosmettatos,[1] who reports two cases, may arise from the glands of Krause, or the glands of Henle, or from included epithelium, following adhesion of folds in chronic inflammation. Oatman[2] suggests that the ideal conditions for their formation are furnished by the operation for trachoma by expression. Butler[3] reports a case in which such a cyst, developed from the upper cul-de-sac, had grown almost as large as the eyeball.

DISEASES OF THE CORNEA.

Suppurating Corneal Ulcer with Hypopion has been treated by Rollet[4] by capillary drainage with a horsehair. With a Graefe knife, a puncture and counterpuncture are made in the limbus, at the lower corneal margin, about 8 or 10 mm. apart. The knife is then withdrawn without dividing the bridge between the puncture and counterpuncture. The end of a piece of horsehair is entered through the puncture, passed along the lower periphery of the anterior chamber, and brought out of the counterpuncture. About 2 cm. length of hair is left hanging out each side of the cornea; and the eye is bandaged. The hair is left in position about forty-eight hours. During this time all pus drains away from the anterior chamber, and the corneal ulcer takes on a more healthy condition, just as it does after the Saemisch section. The permanent drainage thus secured obviates any necessity for reopening with a probe the corneal section from time to time, a procedure often found necessary after the Saemisch incision.

A procedure like Rollet's to combat corneal infection is quite in harmony with the latest bacteriological investigations. The experimental study of zur Nedden[5] indicates that the normal aqueous and vitreous contain no bactericidal substances. But when the intra-ocular fluid is drained away, blood serum having active bactericidal properties is poured out to take its place. After a corneal section the contents of the aqueous and vitreous chambers are thus enabled to combat the bacterial invaders. This ability is renewed by reopening of the incision and fresh drainage of fluid. On theoretical grounds permanent continuous drainage should be yet more efficient; and Rollet reports a very favorable experience with it.

[1] Archives d'Ophtalmologie, April, 1907.
[2] Archives of Ophthalmology, May, 1907.
[3] Ophthalmoscope, December, 1907.
[4] Ibid., March, 1907.
[5] Graefe's Archiv f. Ophthalmologie, Band lxv, Heft ii.

Subconjunctival injections have been employed in the treatment of hypopion ulcer; and very favorable reports given of their influence. Maggi[1] records his experience with the use of 0.75 per cent. sodium chloride, 1 to 5000 mercuric chloride, and 1 to 400 quinine hydrochloride solutions. The last seemed to have the best effect. Henderson[2] thinks "the whole theory of antiseptic subconjunctival injections for the treatment of hypopion keratitis rests on a wrong interpretation of the physiological facts, and, therefore, cannot be anything but harmful." He says "to inject irritating substances into the subconjunctival tissue can only add to the existing irritation."

But if such irritants provoke the outpouring of blood serum, with its bactericidal substances, into the subconjunctival tissue, from whence they are certain to pass into the cornea, we may thus be able to command more potent bactericidal influences than are available in any of the chemical antiseptics that have achieved reputation through laboratory experiments. Methods of treatment must be judged in the end by clinical experience. A case that seems strikingly to illustrate the value of subconjunctival injections is recorded by Edwards.[3] An eye was suffering from traumatic suppuration. Its condition was described as follows: "The eyelids were very much swollen, the conjunctiva was edematous and of a dusky-red color; all that could be seen of the cornea was a yellow washleather-like substance in the heart of the red conjunctiva." It was at first condemned to enucleation, but under subconjunctival injections it recovered vision sufficient to tell the time on a watch.

Serpent Ulcer of the Cornea is a term applied by different writers to various conditions. Some would include most suppurating ulcers in this class. It has been attempted to give it a more definite meaning by restricting the term to ulcers caused by the pneumococcus; and these more generally exhibit the creeping, superficial character to which the term serpiginous, or serpent ulcer, best applies. Woodruff,[4] while believing that the majority of cases will recover under moist heat, frequent cleansing, and atropine, and resorting to subconjunctival injections of cyanide of mercury made deeply, and used as often as twice in twenty-four hours, recommends for pneumococcus ulcer, early cauterization.

Morax[5] reports three cases of pneumococcus ulcer and one of pneumococcus conjunctivitis treated by *instillations of bile from the rabbit.* Experiment has shown that this is particularly fatal to the pneumococcus. The results were favorable in all cases. The conjunctivitis disappeared within three days; and the cases of ulcer made rather rapid improvement. The application of the remedy consisted in instilling a single drop of

[1] Annali di Ottalmologia, April, 1907.
[2] Ophthalmic Review, September, 1907.
[3] Ophthalmoscope, November, 1907.
[4] Journal Ophthalmology and Oto-Laryngology, April, 1907.
[5] Annales d'Oculistique, November, 1907.

rabbit's bile, undiluted, upon the cornea. This caused rather sharp pain which continued for several minutes. In two cases the application was repeated on succeeding days, and in one case it was used three times. In a case of suppurating ulcer, due to the bacillus pyocyaneus, such an application was of no benefit.

Seven cases of corneal ulcer, two of which are described as serpiginous, are reported by McKee[1] as due to the *diplobacillus of Morax and Axenfeld*. The discovery of the organism led to treatment with solutions of zinc sulphate, and a rapid cure.

Weigelin[2] reports a case of corneal ulceration in an infant, aged two months, in which one cornea was destroyed and the other perforated, by ulcers due to the diplobacillus of Morax and Axenfeld. This damage had been done when the case was first seen, eight days from the beginning. Under zinc sulphate the inflammation rapidly subsided. Eperon, at the last meeting of the French Ophthalmological Society, reported a case in which rapid recovery followed cauterization of the corneal ulcer with a 20 per cent. solution of zinc sulphate.

Syphilis of the Cornea. In four cases of *keratomalacia*, occurring in infants of from seven weeks to nine months, Stephenson[3] found the Spirocheta pallida rather abundant, in scrapings of the broken-down tissue. Rona,[4] inoculating the rabbit's cornea with syphilitic material, obtained lesions about which he found the Spirocheta pallida in great numbers. The spirochetæ were most numerous in parts in which the inflammatory changes were still but slight. When the inflammation was well established, but few were found. Schulze,[5] who originally called attention to the transmission of syphilis to the cornea of the rabbit by inoculation, points out that by the silver staining method of Levaditi, especially in sections made parallel to the surface of the cornea, appearances closely resembling the spirochetæ may be obtained by the staining of nerve fibrils or other structures.

Corneal Opacities. In a case of *myxedema*, Collins[6] found a grayish haze in the centre of the cornea, which reduced vision to one-sixth of normal. When strongly magnified, this was found to be due to small globular gray dots, situated in the anterior layers of the cornea, while the overlying surface showed some slight elevations. He suggests that these dots may have been dots of mucin, deposited in the cornea much as it is deposited in the skin. Under thyroid treatment the cornea cleared up, and vision became normal, with marked improvement in the patient's general condition.

[1] Ophthalmic Record, April, 1907.
[2] Klinische Monatsblätter f. Augenheilkunde, August and September, 1907.
[3] Ophthalmoscope, December, 1907.
[4] Pester Med. Chir. Presse, 1907, Nr. 9.
[5] Klinische Monatsblätter f. Augenheilkunde, May and June, 1907.
[6] Trans. Ophth. Soc. of United Kingdom, xxvii, p. 47.

Opacities Due to Lime and Lead. The white opacity of the cornea caused by lime, zur Nedden[1] finds to be due to the action of lime upon mucoid substances, producing a dense white precipitate. At first very little of the lime is present as a carbonate. And during this early stage it may be removed, and the opacity diminished by subjecting the cornea to a bath of (5 or 10 per cent.) ammonium tartarate. Later the calcium carbonate is formed, and this treatment is less effective. Lead opacities, from the first, contain lead carbonate, and are best removed by scraping.

THE UVEAL TRACT.

Albinism. For the improvement of vision in albinos, Komoto[2] has resorted to the injection of India ink beneath the conjunctiva and into the lids. The disfigurement produced by such a procedure is serious. To avoid it he tried the use of lead carbonate. This caused little disfigurement and little irritation, but it failed to give the same benefit. In one of the cases treated with injections of ink, vision was improved from counting fingers at 5 feet to 20/50. Komoto suggests that narrowing the palpebral fissure would lessen the deformity from injecting ink into the bulbar conjunctiva; and that it might be injected into the inner surface of the lids and along the lid margins without causing any very unsightly appearance. In commenting upon the plan, Sym[3] advises that before attempting such a radical procedure it would be well to try if vision be improved by placing before each eye a close opaque screen with a small aperture. If this did not improve vision it would be useless to resort to the ink injections.

Komoto points out that albinism is very rare in Japan. Lagleyze[4] reports 15 cases of complete and 1 of incomplete albinism from his practice in Buenos Ayres. He concludes that albinism is preventable by prohibiting marriage of those who carry the hereditary tendency to it. A considerable proportion of his patients were the offspring of consanguineous marriages. But most of these, and nearly all others who could be investigated, gave a history of albinism in direct ancestors or collateral branches.

Iritis may arise by extension from inflammations of neighboring parts, or it may be traumatic or sympathetic in its origin. But apart from the few cases thus accounted for, it must be regarded as a manifestation of some general disease. This fact needs greatly to be emphasized, even among those who undertake the treatment of general rather than ocular

[1] Archiv f. Augenheilkunde, February, 1907.
[2] Klinische Monatsblätter f. Augenheilkunde, May and June, 1907.
[3] Ophthalmic Review, October, 1907.
[4] Archives d'Ophtalmologie, May, June, and July, 1907.

diseases. It is abundantly illustrated in the literature of the past year. De Micas[1] reports a case due to mumps, and quotes others from the same cause. He considers these cases characterized by being bilateral, the inflammation of moderate severity, the formation of posterior synechiæ, and a tendency to markedly lower vision. Michaeler[2] records a case of iridocyclitis following vacination. Zentmayer and Chance[3] mention some thirty general diseases in discussing the etiology of iritis and its occurrence in general disease. Terrien and Cantonnet[4] have resorted to blood examination for the determination of the cause of iritis. They report thirty cases, but the chief light shed upon the subject by such examinations appears to be that in iritis associated with infectious diseases the blood count in syphilitic cases approaches the normal, while in other acute infections there appears a decided leukocytosis.

In the treatment of iritis the treatment of the general condition causing it is of first importance. Beyond this, dilatation of the pupil and relief of pain are the principal things to be accomplished. Ellett[5] calls attention to the value of cocaine used in conjunction with other mydriatics to dilate the pupil. In discussing Ellett's paper, Greenwood, Williams, and Parker spoke of the use of paracentesis; both to prevent secondary glaucoma and as a routine measure to aid in dilatation of the pupil.

Uveal Tuberculosis. The frequency with which chronic and relapsing inflammations of the uveal tract are caused by tuberculosis is an important question as yet unsettled. Last year there appeared about thirty papers upon uveal tuberculosis. The most important being one by Stock[6] dealing with the etiology of these chronic inflammations. By inoculating pure cultures of the tubercle bacillus into the blood of rabbits he succeeded in producing lesions resembling those observed in the human eye in chronic uveitis. To test for the tuberculous character of chronic iritis he took pieces of the iris obtained by iridectomy from such cases and transplanted them into the eyes of animals in fifteen cases without tuberculous infection of any animal. Inoculations with the aqueous humor were equally negative.

Stock believes, however, that in the tuberculin reaction we have a diagnostic resource that should be called upon in every case of chronic uveitis. If the patient does not react to tuberculin, tuberculosis may be excluded. If a reaction does occur, but other causes are evident for the iritis, it may be best first to treat with reference to these other causes. But when treatment in that direction is unsuccessful, treatment for tuberculosis should be tried.

[1] Recueil d'Ophtalmologie, July, 1907.
[2] Die Ophth. Klinik, March 5, 1907.
[3] Therapeutic Gazette, August 15, 1907.
[4] Archives d'Ophtalmologie, May, 1907.
[5] Section on Ophth., American Medical Association, 1907.
[6] Graefe's Archiv f. Ophthalmologie, Band lxvi, Heft 1.

Stock considers the process undoubtedly tuberculous when there is a local reaction; or when, with a general reaction to tuberculin, small, barely visible, grayish nodules, or thickenings of the iris at its inner circle, can be discovered with the binocular loupe. These nodules are only visible with the loupe, and with the general reaction to tuberculin. He has never seen them in iritis from other causes, and they were present in the eyes of animals subjected to blood inoculations with the tubercle bacillus. They are easily distinguished from the small nodules of syphilis which are attended with greater hyperemia, and are reddish brown in color.

Stock believes that chronic uveitis of tuberculous origin is comparatively common at Freiburg. By far the best treatment for chronic uveitis, due to tuberculosis, is by tuberculin injections. Many other favorable reports of the influence of tuberculin in ocular tuberculosis have been recorded. Bull[1] reports ten cases of ocular tuberculosis, all influenced favorably, and some of them strikingly so. In one case of tuberculous iritis the miliary nodules, and a larger tumor, were entirely removed in ten weeks; and eighteen months later there was no recurrence. In another case under treatment four months, receiving forty-six injections, improvement was noticed after the third week, and vision was brought up from 15/200 to 15/30.

In discussing Bull's paper, Hess stated that tuberculous disease of the eye may heal without treatment, even where tuberculosis had been demonstrated by inoculation in the rabbit. This fact greatly lessens the value of the older statistical observations that indicated that uveal tuberculosis was very rare, or of statistics based upon eyes enucleated because disorganized. Thus Collins,[2] among 1523 eyes removed, found only 7 presenting intra-ocular tuberculosis. Hess says that of 100 patients submitted to the tuberculin test, more than 50 gave the tuberculin reaction.

Panophthalmitis. General intra-ocular suppuration, although not of very frequent occurrence, may be produced by a large variety of pathological bacteria. Unna[3] reports a case in which the *influenza bacillus* was the cause of the suppuration. I have recently seen a case of this kind. The patient first had a double pneumonia. This was followed by the panophthalmitis as the pneumonia was improving; and this in turn was succeeded by fatal pericarditis. The pus from the interior of the eye showed the influenza bacilli in great numbers, without other organisms. Unna describes them as equally abundant. In the conjunctival sac they were mixed with other bacteria. In sections of the enucleated eye he found many foci of influenza bacilli in the vitreous.

---

[1] Section on Ophth., American Medical Association, 1907.
[2] Ophthalmoscope, February, 1907.
[3] Klinische Monatsblätter f. Augenheilkunde, Supplement, 1907.

A case in which the pathogenic organism was the streptococcus is reported by Jocqs.[1] The patient suffered from tuberculous abscesses, and the eye was enucleated for a supposed tuberculous lesion. There was lacrymal disease following scarlet fever, which had occurred five weeks before, and there was corneal ulceration. In a case of metastatic ophthalmia occurring in the course of puerperal pyemia, reported by de Schweinitz,[2] the streptococcus was the causative organism. In this case both eyes were destroyed, although the patient's life was saved.

It has sometimes been questioned whether the Bacillus subtilis was pathogenic; but enough cases have been published to establish the fact that when it gains entrance into the interior of the eyeball, as it may by traumatism, it is extremely dangerous. Bietti[3] reports a case of perforating wound followed by a panophthalmitis, in which this was the organism found; and inoculation of the vitreous with pure cultures obtained from this case produced intense and rapid panophthalmitis in the rabbit. The same bacillus obtained from another patient, suffering from corneal ulcer which ended in recovery, showed the same virulence when placed in the vitreous of the rabbit. The results of different inoculations, however, varied considerably in severity.

Sympathetic Ophthalmitis. The theory of sympathetic ophthalmitis, ascribing it to cytotoxins passing from the exciting to the sympathizing eye, through the general circulation, was referred to last year and two years ago.[4] It is somewhat supported by the experiments of Santucci,[5] who excited iritis by injecting under the skin of a rabbit the emulsion of an eye from another rabbit. Anatomical studies of sympathetic ophthalmia have for the last year centred round the views of Fuchs, that the essential lesion in eyes causing sympathetic ophthalmitis is an infiltration of the uveal tract with lymphocytes, giant cells, and epithelioid cells; and that the epithelioid cell proliferation is the essential characteristic of this disease. Brown,[6] who reports three cases, finds that they thoroughly support the view of Fuchs; and he considers the evidence that sympathetic inflammation is caused by a proliferating uveitis is conclusive. Kitamura,[7] from the histological examination of twelve eyes, enucleated at Uhthoff's Clinic, also found these epithelioid cells infiltrating, especially the posterior layer of the iris and the inner portion of the ciliary body. Although Fuchs found the infiltration greater in the posterior part of the choroid, Kitamura thinks Fuchs has established the histological characteristic features of the disease. In prepa-

---

[1] Recueil d'Ophtalmologie, July, 1907, p. 428.

[2] Annals of Ophthalmology, January, 1907.

[3] Clinica Oculistica, June, 1907.

[4] PROGRESSIVE MEDICINE, June, 1906, p. 354.

[5] Ophthalmic Review, March, 1907.

[6] Archives of Ophthalmology, March, 1907.

[7] Klinische Monatsblätter f. Augenheilkunde, August and September, 1907

rations of eyes not causing sympathetic disease the microscope showed a different picture.

Lenz[1] had the opportunity of examining both the exciting eye and the sympathizing eye, in a case of sympathetic ophthalmitis, also from Uhthoff's Clinic. His observations support the views of Fuchs. Like Kitamura, he found the infiltration in the exciting eye, chiefly in the anterior uveal tract. In the sympathizing eye the choroid was principally affected, especially near the equator. But in a general way the process was the same in the two eyes. Zentmayer[2] reports two cases, in which the histological examination of the exciting eye supported the view that sympathetic ophthalmia is essentially a proliferative infiltrating uveitis. In one of the eyes examined the appearances indicated marked plastic inflammation; and in this case the sympathetic ophthalmitis was of a pronounced plastic type. In the other eye examined there was an entire absence of posterior adhesions and fibrinous exudate, and in this case the inflammation in the sympathizing eye was of a similar character—an intense neuroretinitis, with anteriorly only a slight deposit on the membrane of Descemet.

TIME BETWEEN INJURY AND SYMPATHETIC DISEASE. Fromaget[3] reports the case of a boy, aged eleven years, who developed sympathetic ophthalmitis eighteen days after a comparatively slight injury to the other eye, for which the surgeon was only consulted on the sixteenth day. On the other hand, Sulzer[4] reports a case in which a shrunken eye had remained quiet for thirty-seven years after a penetrating wound, when uveal inflammation developed in its fellow. This, however, was controlled, the stump of the injured eye remaining quiet throughout. Rockliffe[5] reports four cases. In one a foreign body was carried in the injured eye eighteen years. During the last four years the good eye was subject to attacks of conjunctivitis on the slightest provocation, and finally well-marked sympathetic irritation, with keratitis punctata, arose. Enucleation of the exciting eye gave permanent relief. In the second case the right eye had been damaged twenty-two years when a splash of hot acid irritated it, and sympathetic inflammation was set up in the left. After enucleation of the exciting eye the other quieted down with vision of 1/10. In the third case the left eye had been injured fifty-one years before. The right had transient amblyopia and frequent conjunctivitis, and became normal after removal of the left. In his fourth case the left eye, which had been damaged twenty-eight years, became tender, and there was dimness of vision in the right, with conjunctivitis and doubtful rise of tension after using atropine. While these cases did not

---

[1] Klinische Monatsblätter f. Augenheilkunde, Supplement, August and September, 1907.

[2] Trans. Amer. Ophth. Soc., vol. xi, pt. ii.

[3] Annales d'Oculistique, April, 1907, p. 283.

[4] Ibid., February. [5] Trans. Ophth. Society of United Kingdom, vol. xxvii.

show violent inflammation, three of them exhibited deposits on Descemet's membrane in the sympathizing eye.   They illustrate the possibilities of harm that exist in every retained, blind, disorganized eyeball.

GLAUOOMA.

The general interest in the *pathogenesis of glaucoma*, and the activity of a large group of workers in tracing its exact anatomical lesions, are beginning to yield more definite knowledge of the disease processes that constitute it.   Some of the results arrived at were noticed last year. To them may be added the observations of Henderson[1] that the pectinate ligament undergoes a process of sclerosis, as a purely physiological process, which gradually diminishes its permeability for the escape of fluid from the angle of the anterior chamber.   He also thinks that the iris constitutes a drainage channel of great importance.   As the ligament becomes less pervious, the importance of keeping open the iris crypts, by contraction of the pupil, and the danger of closing them by mydriasis, progressively increase.   Henderson also points out that iridectomy opens a permanent channel for the drainage of the intra-ocular fluid, as the iris stump left by this operation never cicatrizes.   The value of this channel is lessened, however, if the iris be atrophied or degenerated.

Besides the physiological sclerosis, the blocking of Fontana's spaces by cell elements, derived from various sources, is a demonstrable cause of glaucoma.   Alt,[2] in a case of glaucoma supervening upon serous uveitis, found the spaces of the pectinate ligament blocked with pigment cells, which proved to have been derived from the ciliary body and the posterior surface of the iris.   Brown Pusey,[3] in glaucoma secondary to intra-ocular tumor, found these spaces blocked by pigment cells originating in the tumor.   Ischreyt and Reinhard,[4] in a case of absolute glaucoma, found the whole posterior surface of the cornea covered with endothelial cells, in a state of fatty degeneration, which had wandered from the posterior surface of the iris, and possibly elsewhere.   In a case of glaucoma following cataract extraction, with delayed union from eversion of the flap, Oatman[5] found the anterior surface of the iris lined by layers of epithelial cells, from invasion of the anterior chamber while the wound remained open.   Werner,[6] in a case of absolute glaucoma following chronic uveitis, found the anterior surface of the iris covered with stratified epithelium which had undoubtedly made its way into

[1] Ophthalmic Review, September, 1907.
[2] American Journal of Ophthalmology, August, 1907.
[3] Archives of Ophthalmology, March, 1907.
[4] Ibid., May, 1907, p. 419.
[5] Ibid., March, 1907, p. 278.
[6] Trans. Ophthalmological Society of United Kingdom, xxvii, 131.

the anterior chamber through some perforation or incision. The gradual extension of these cells into the filtration angle probably produced the glaucoma.

Cupping of the optic nerve in glaucoma has been a subject of discussion, in which the leading parts were taken by Schmidt-Rimpler[1] and Elschnig.[2] The latter believes that in the cupping of optic atrophy there is never any pushing back of the lamina; and by atrophy of the retina a physiological cup may even become shallower, although it becomes broader. Increased depth in the excavation, he thinks, belongs to glaucoma, whether from disappearance of nerve fibers and supporting tissue, or from forcing back of the lamina. He had not encountered cavernous atrophy of the nerve, apart from glaucoma. Schmidt-Rimpler believes that it may be impossible to differentiate simple glaucoma from amaurosis with excavation of the optic nerve, a form of primary atrophy. He has reported a case of pushing back of the lamina without glaucoma. Elschnig would regard this case as glaucomatous.

Treatment of Simple Glaucoma. This has been the subject of important discussions in at least five ophthalmic sections and societies during the past year. Von Hippel[3] holds that iridectomy is the proper remedy, and reports quite favorable results in a series of 66 cases. After operation there was no diminution in vision in 27 eyes, 15 of which were observed for periods of five to fourteen years. There was slow deterioration of sight in 17 eyes, but not complete blindness after periods of one to thirteen years. Blindness became complete in one to five years in 13 eyes; and the remainder had continued under observation for only short periods. This is, perhaps, the most favorable experience with the operative treatment of simple glaucoma that has been placed on record. Von Hippel objects to any use of myotics that would postpone a resort to iridectomy. But it should be noted that he insists on the regular use of myotics after the iridectomy. This is an important part of the treatment that has given such good results. As Zentmayer suggested in the discussion of Cheney's paper, it is impossible to apportion the credit between the operation and the myotic in such cases.

Cheney[4] treats of iridectomy and myotics together. He regards this joint treatment as one that holds hope of marked benefit to the patient. Risley[5] advises early, properly performed iridectomy. Bull,[6] for simple glaucoma, thinks that iridectomy, done early, offers better prospects for the arrest of the process for a longer period than other methods of treatment now available. His characterization of the class of cases he has

[1] Klinische Monatsblätter f. Augenheilkunde, October and November, 1907.

[2] Trans. XXXIVth Heidelberg Ophthalmological Congress.

[3] Klinische Monatsblätter f. Augenheilkunde, July, 1907.

[4] Ophthalmology, April, 1907.

[5] Trans. Section on Ophthalmology, American Medical Association, 1907.

[6] Trans. Amer. Ophthalmological Society, vol. xi, 2.

in mind, however, includes cases with more or less distinct exacerbations, although not inflammatory. Young[1] thinks that the risks of operation are such, and the prospect of prolonged retention of vision under myotics is sufficiently good, to at least justify the surgeon in leaving it to the patient to decide if he will submit to operation. In the discussion of the papers mentioned many of the foremost ophthalmologists in this country and Europe took part. But the views expressed by all are in the main represented in the above summaries.

Cheney considered the subject of *sympathectomy*. He thought the evidence in its favor was not convincing up to the present time, although it had been so commonly tried as a last resort that it could not be fairly condemned on the experience thus far recorded.

Cyclodialysis for Glaucoma. This operation, proposed by Hiene two years ago, is being rather extensively tried and reported upon. An incision is made in the sclera, 5 or 6 mm. back from the corneal margin and parallel to it, without injuring the uveal tract. A spatula is then thrust between the sclera and the uveal coat, through the pectinate ligament into the anterior chamber, the idea being to make a permanent communication between the anterior chamber and the suprachoroidal space. Boldt[2] reports an experience in Deutscheman's Clinic of operation on 37 eyes, in 31 of which there was some distinct improvement, and in 25 permanent reduction of intra-ocular tension. He thinks iridectomy is to be preferred in acute and subacute glaucoma, but that this operation should have further trial for simple and chronic inflammatory glaucoma. Weekers reports[3] Axenfeld's experience in 5 very unfavorable cases, none of which was permanently improved by operation. Meller[4] reports favorable results in 40 per cent. of cases, one eye gaining vision of $\frac{6}{9}$, which had been retained eight months. In 30 per cent. there was temporary improvement, and in 30 per cent. no improvement whatever. In a chronic case, operated on by Sewall,[5] vision after three months remained the same as before the operation.

CRYSTALLINE LENS AND VITREOUS.

Glassblower's Cataract. This has been the subject of important papers by Cramer,[6] Robinson,[7] Hess,[8] Snell,[9] and Thompson.[10] From clinical studies Cramer finds that in this form of cataract the opacity invariably

[1] Trans. Amer. Acad. of Ophthalmology and Oto-Laryngology, 1907.
[2] Beiträge zur Augenheilkunde, 1907, vol. lxviii.
[3] Klinische Monatsblätter f. Augenheilkunde, August-September, 1907.
[4] Ibid., December, 1907, p. 597.
[5] California State Medical Journal, May, 1907.
[6] Klinische Monatsblätter f. Augenheilkunde, January, 1907.
[7] Brit. Med. Jour., August 17, 1907.   [8] Archiv f. Augenheilkunde, May, 1907.
[9] Brit. Med. Jour., January 5, 1907.   [10] Ibid., August 31, 1907.

begins as small dots, near the posterior pole of the lens, confined within the pupillary area. Gradually it becomes more uniform, but is often limited to this region for many years. It occurs more frequently in the left eye, and is associated with a reddish-brown discoloration of the skin of the left side of the face. This is the side most exposed to the furnace, except when the worker is left-handed. Robinson also notes that the cataract begins at the posterior pole, immediately beneath the capsule, and that its outline is not radial or rosette-shaped, like traumatic cataract in this region. He also notes that the liability to such cataract exists chiefly among those who make ordinary bottles, for which large tanks are used, heated to 2500° F. Flint bottles are made with a lower degree of heat, and the makers seem less liable to cataract.

Robinson regards heat as the important factor in causation. But Cramer points out that, although continual exposure to heat favors the early formation of ordinary senile cataract, it does not account for this particular form. He also argues that increased perspiration, causing a concentrated aqueous, would equally involve both eyes; and congestion, due to continuous blowing, would equally affect the players of wind instruments.

The cataract forms in the part of the lens most subjected to the action of light, the other parts being protected by the iris. It has been proved that exposure to ultraviolet rays can cause the changes in the skin which are associated with this form of cataract. Lime-light is particularly rich in such rays, and lime is used in the composition of the glass. Cramer notes an especial freedom from dacryocystitis among sufferers from this kind of cataract, and ascribes it to the bactericidal action of the ultraviolet rays.

Hess has experimented as to the effect of ultraviolet rays upon the crystalline lens in frogs, guinea-pigs, rabbits, and an ape. He finds that exposures to them set up degenerative changes in the capsular epithelium of the lens, which changes are strikingly shown in the illustrations that accompany his paper. These changes are followed by cell proliferation, but it is evident that if the exposure be sufficiently continued, or frequently repeated, the regeneration will be incomplete. These experimental studies seem to furnish the link necessary to complete the chain of evidence of the dependence of glassblower's cataract upon exposure to ultraviolet or closely allied rays.

Snell, at Sheffield, England, has not been able to satisfy himself that bottlemakers there show any special liability to cataract, but Robinson, at Sunderland, found that among 400 employed in glassworks, 40 were known to have cataract; and that among 114 superannuated glassworkers, 37 suffered from cataract. Thompson quotes the statement that makers of Venetian glass rarely reach middle age without loss of sight from cataract or optic atrophy.

These widely differing proportions of workers thus affected should

suggest the minute study of the conditions under which they work, as likely to lead to efficient measures of prophylaxis. Hess found that the interposition of a plate of ordinary glass prevented the degenerative changes in the capsular epithelium. Robinson finds that the wearing of dark goggles by the men is believed to have done much good, and Cramer suggests that a double glass screen, containing a thin layer of water-colored fuchsin, would be of advantage.

This question of the influence of ultraviolet rays is of more general interest than its bearing on glassworkers would indicate. With the multiplication of new sources of artificial light comparatively rich in short-wave rays, it comes to have a very general bearing on ocular hygiene. Vogt[1] calls attention to an almost colorless glass, which he has found almost impervious to violet and ultraviolet light.

Clearing of Lens Opacities. Connor[2] reports in abstract 6 cases seen by himself, in which distinct lens opacities, including cortical striæ, diminished or disappeared, the lens partly or completely regaining its transparency. He also collected the experience of prominent American ophthalmologists upon this point, and finds: "Ten observers report 23 cases in which they have seen striæ of incipient cataract disappear from one or both lenses, taking with them the diffuse opacity. Twenty-six observers report about 84 cases in which they have seen the diffuse opacity of the lens in incipient cataract regain transparency—no mention being made of striæ. Fourteen observers report 33 cases of incipient cataract regaining partial transparency." Including his own, 51 observers report 147 cases in which the lens affected with incipient cataract has regained its transparency. These facts suggested the question, How was it done? and the need for closer study of the conditions under which cataract develops.

Neeper[3] subjects his patients with incipient cataract to the following treatment: At first he secures free catharsis with magnesium sulphate, and afterward a mild purge from calomel once a week. Syrup of hydriodic acid, 10 to 30 minims, is taken thrice daily. Free water drinking is encouraged, and but limited use of coffee. Locally a solution of dionin is instilled daily, beginning with 1 per cent. and increasing to 5 per cent. Close work was reduced. Two patients who did not improve while doing close work did so when it was discontinued. He reported on 24 cases, which generally showed improved vision. Nearly all of those having vision of $\frac{20}{60}$, and lens opacity of a light milky tint, had improvement of vision.

Bernstein[4] reports 2 cases, one of lamellar and the other of nuclear cataract, which improved under subconjunctival injections of dionin.

[1] Archiv f. Augenheilkunde, December, 1907.
[2] Trans. Section on Ophth., American Medical Association, 1907.
[3] Ophthalmic Record, February, 1908, p. 91.
[4] Ophthalmology, July, 1907.

Menacho[1] reports his experience with subconjunctival injections of potassium iodide, which have been recommended with more enthusiasm and persistence than was justified by any recorded experience with them. Menacho obtained no improvement in any case, and the injections always caused irritation and adhesions of the conjunctiva to the eyeball.

Abscess of Vitreous. Cramer[2] reports the case of a young man in whom a piece of guncap had penetrated the vitreous. Vision, at first normal, had fallen at the end of a week to counting fingers at 6 meters, and a globular yellow mass was to be seen in the vitreous. An attempt was made to extract the foreign body, but the efforts to grasp it with forceps were unsuccessful. However, the thin pus it contained escaped from the abscess, which was thoroughly evacuated in the attempt. The eye then became quiet, the vitreous cleared up, and the foreign body became clearly visible.

Abscess of the vitreous is closely allied to purulent choroiditis. In many cases it is impossible to determine whether an inflammation, that comes to involve the whole eyeball, started in the one situation or in the other. They are similar, too, in that, next to trauma, metastasis is the most common cause. Hitschmann[3] records 3 cases occurring in an epidemic of cerebrospinal meningitis. Two ended in recovery with a shrunken eyeball, and 1 case was fatal. Vogelsang[4] reports 6 cases— 3 traumatic and 3 metastatic—from the clinic of Professor Straub. All came to enucleation. The common course—to shrinking of the eyeball, or enucleation—contrasts so strongly with the result in Crame's case, that where the diagnosis is fairly certain, the opening and free evacuation of the abscess seem entirely justified.

RETINA, OPTIC NERVE, AND CENTRES.

Lesions of Vessel Walls. Ever since the ophthalmoscope came into common use observations regarding visible changes in the retinal vessels have been accumulating. During the last few years these have been supplemented by careful microscopic studies of the lesions causing them. Recently various ophthalmologists have attempted to bring together in a systematic, connected way such scattered observations. The papers that do this are of general interest to the practitioner of internal medicine and the profession at large.

ANGIOSCLEROSIS is a general disease, that can be better studied by the ophthalmoscope than by any other one method. Observations made

[1] Archivos d'Oftalmol. Hispano-Americano, June, 1907.
[2] Centralblatt f. praktische Augenheilkunde, June, 1907.
[3] Zeitschrift f. Augenheilkunde, September, 1907, p. 286.
[4] Ophthalmology, October, 1907, p. 183.

with this instrument combine the advantages of those made on the living body by more common clinical methods, with the minuteness of microscopic studies. The largest retinal vessel seen with the ophthalmoscope may be $\frac{1}{100}$ of an inch in diameter. From such trunks the circulation can be traced fairly into the capillaries.

The retinal symptoms of angiosclerosis are grouped by de Schweinitz[1] under the headings "suggestive" and "pathognomonic" (see PROGRESSIVE MEDICINE, June, 1907). The three symptoms to be looked for early are a "corkscrew appearance" of some arterial twigs, flattening of a vein in contact with an artery, and a congested appearance of the nerve head. The corkscrew appearance, or "kinkiness," of some of the small arteries is also especially mentioned by Macleish.[2]

Lamb,[3] who emphasizes the importance of early recognition of angiosclerosis, finds the earliest ophthalmoscopic signs are slight haze of disk and surrounding retina, with obscuration of the capillary vessels, and apparent nodes or interruptions in them, and tortuosity of the small vessels about the macula, or toward the periphery of the fundus.

Marple examined ophthalmoscopically 46 patients suffering from hemiplegia or paraplegia. Six of these had sufficient lens opacity to prevent satisfactory examination of the fundus details. Of the remaining 40, 16 showed changes in the veins where crossed by arteries, and 12, in association with those changes, local constriction or varicosities; 2 had opacity of the vessel walls (perivasculitis), and 2 beading of the arteries. Pathognomonic symptoms of angiosclerosis were present in 83 per cent. of the cases. The remaining 7 cases had "suggestive" symptoms—dilated veins and small brilliant arteries. But these latter symptoms were so pronounced, the veins were so much dilated, the arteries so brilliant, that their significance was more than a suggestion of the condition present.

These vascular changes discovered with the ophthalmoscope have all the prognostic importance of arteriosclerotic degenerations discovered by more common clinical methods. The significance of those associated with chronic Bright's disease, and of retinal hemorrhage in old people, have often been emphasized; but all of them are of general importance. Marple points out that they can only be detected when the fundus is examined in the erect image, and that often the use of a mydriatic is necessary. He protests against the examination for glasses, in a perfunctory manner of patients who have reached middle age. We should not only investigate their need for glasses, "but of equal, if not greater importance, is it that we investigate most carefully the condition of the retinal vessels, and ascertain whether or not there are present any ocular evidences of arteriosclerosis."

[1] International Clinics, seventeenth series, i.
[2] Southern California Practitioner, January, 1907.
[3] Trans. Amer. Acad. of Ophthalmology and Oto-Laryngology, 1907.

The extreme alterations in the retinal vessels, that are compatible with useful vision, are illustrated by cases of perivasculitis reported by de Schweinitz and Oliver, at the last meeting of the American Ophthalmological Society, as well as my own case of venous dilatation in polycythemia,[1] and one of telangiectasis of the retinal capillaries recorded by Pollock.[2]

Optic Nerves and Sinus Disease. It is a long step, and a very important one, from knowing that a rare or possible connection may exist between two pathological conditions, to an appreciation of just how a certain symptom arises from a common etiological condition. This step is being taken with reference to connection of disease of the accessory sinuses of the nose, with ocular lesions and symptoms. Inflammations of the optic nerve, heretofore called idiopathic, or ascribed to "cold," "rheumatism," and "auto-intoxication," seem largely to arise from disease of the adjoining sinuses.

Birch-Hirschfeld[3] reports 4 cases of his own, in which optic neuritis, arising from disease of the nasal accessory sinuses, was marked by central scotoma, long regarded as a most characteristic symptom of retrobulbar optic neuritis. He also brings together 6 cases from the literature in which this symptom has been recognized. He finds that both venous congestion and a toxic factor may enter into the production of the lesion of the optic fibers. Because of the difficulty of recognizing disease of the posterior ethmoidal and the sphenoidal cells, and the great danger from such disease both to vision and to life, the suggestion offered by central scotoma is important.

Central scotoma of toxic origin is commonly bilateral. When due to sinus disease it is more likely to be unilateral, although in 3 of the 10 cases brought together both eyes were affected. Fish,[4] in 36 consecutive cases of optic neuritis, encountered disease of the nasal accessory sinuses in 26. Improvement followed treatment of the sinus disease in 15 cases, and 3 in which the disease was bilateral were restored to normal. Chronic sinusitis may remain dormant for long periods, and then become suddenly manifest. Fish emphasizes the statement that an absolutely negative nasal finding does not exclude accessory sinus disease.

Mayer[5] records a case in which vision was suddenly lost after an attack of coryza; in one eye completely, in the other eye partly. Drainage of the maxillary, sphenoid, and ethmoid sinuses restored almost normal vision in the latter, but the former remained blind. Suker[6] saw

[1] Trans. American Ophthalmological Society, xi, 2.
[2] Trans. Ophthal. Society of the United Kingdom, xxvii.
[3] Graefe's Archiv f. Ophthalmologie, Band lxv, Heft 3.
[4] British Medical Journal, November 2, 1907.
[5] Wiener klinische Wochenschrift, xx, Nrs. 25–33.
[6] Ophthalmic Record, March, 1907, p. 141

a case in which vision was suddenly reduced to $\frac{1}{10}$ in each eye; and, after curetting of the ethmoid, improved to $\frac{6}{10}$ in one, and normal in the other.   In this case examination of the nose revealed nothing but congestion of the mucous membrane, yet the ethmoidal cells were found to contain pus and necrotic tissue.

While operations on the nose may be needed to relieve optic neuritis, other nasal operations may cause disturbance of vision.   Laas[1] reports a case in which vision of the right eye was impaired fifteen minutes after removing a spine from the left side of the septum.   The pupil became dilated and sluggish in its reactions.   The upper half of the visual field was lost; the lower half greatly impaired.   Vision subsequently improved to $\frac{6}{15}$, but the right optic disk became partly atrophic.   Laas thinks that the accident here was a fracture of the wall of the right optic canal, somewhat similar to what occurs from heavy blows on the forehead or elsewhere.   Laas also publishes a somewhat similar case seen by Kuttner.   The anatomic relations of the nasal accessory sinuses to the optic canals and chiasm, and the possible mechanism of such accidents, were demonstrated by Onodi at the Hungarian Ophthalmological Congress last year, and by Löwe before the Berlin Ophthalmological Society at the July meeting.

Optic Nerve during Pregnancy.   Knapp[2] has observed 10 cases in which the optic nerve and retina during pregnancy and labor showed changes differing from those of albuminuria retinitis.   He divides these cases into two groups: one in which the changes were due in part or wholly to sepsis; and the other, in which were manifestations of the toxemia of pregnancy.   He reports 3 cases of neuritic atrophy belonging to the latter class.   He has also observed, often with normal vision, pale optic nerves in women who have borne children, and suggests this may be an evidence of toxic influences during a preceding pregnancy.

In these cases the loss of sight is rapid.   In one case both eyes became blind within a week.   Whether central scotoma occurred, Knapp had been unable to determine.   The optic disks were white, with blurred outlines, the arteries narrowed, and in one recent case there was some edema of the retina in the region of the macula.   In discussion of Knapp's paper, Posey reported a somewhat similar case, in which premature labor was followed by improvement of the symptoms.   Bonte[3] also reports a case in which the sight of the left eye was lost during the seventh month of pregnancy.   Two weeks later the right eye became affected; and when seen in the ninth month the woman was blind in this eye also.   The nerve head was slightly swollen, reddish gray, and the pupil reflexes were entirely lost.   Later the disks became gray and white, and the blindness was permanent.

---

[1] Zeitschrift f. Augenheilkunde, August, 1907
[2] Trans. American Ophthalmological Society, xi. 2.
[3] La Clinique Ophtalmologique, August 25, 1907

Toxic Amblyopias. Subjective color sensations are liable to attend amblyopia produced by acute poisoning. These have been investigated and summarized by Hilbert.[1] Yellow vision is probably most frequently experienced, and has been recorded in poisoning from santonin, picric acid, chromic acid, salicylates, carbonic acid, snake-bite, tobacco, phenacetin, iodoform, and in siderosis. Red vision has been caused by the mydriatics, atropine, hyoscyamine, duboisin, scopolamine, and also by tobacco and quinine. Blue vision has been experienced in acute alcoholism, and violet vision from Indian hemp and fungus poisoning. The hallucinations of mescal intoxication are attended with various subjective color sensations.

The vascular changes occurring in the eye and optic nerve, in *quinine blindness* and *tobacco-alcohol amblyopia*, are the subject of a paper by de Schweinitz.[2] He finds that obliteration of the retinal arteries and their conversion into white cords, in cases of long-standing quinine poisoning, both in man and animals, have been confirmed by numerous observers; and in one case thrombi were seen in a retinal vein four days from the onset of blindness. In one recorded case there was progressive atrophy of the iris, probably from toxic disease of the iris vessels; and in another case evidence of disease of the choroidal vessels. In the eyes of animals long blind from quinine there is no evidence of true endovasculitis, and no thrombus formation. De Schweinitz thinks that what he took for a thrombus in his earlier observations was not really of that nature. While vascular disease, thickening and fibrosis, hyaline degeneration of the walls, endo- and periphlebitis have been described in cases of alcohol amblyopia, it is not certain that such alterations constitute the basis of the disease.

Carbon Bisulphide Amblyopia. The increasing use of vulcanized rubber appears to make this form of toxic amblyopia more common. Three cases are reported by Golesceano,[3] as seen in a rubber factory in Paris. The patients were men aged thirty-nine, forty-two, and forty-four years, who had worked two years or more in the vulcanizing department. The ocular symptoms were preceded by other sensory and nervous disorders, which had continued for some months. These disorders included insomnia, headache, numbness, anesthesia, sense of suffocation, and loss of knee-jerks. There was divergent strabismus, impaired reaction of the pupils to light, and in two cases complete failure of the pupil to contract with convergence. There v as impairment for central vision, and complete central scotoma, for some or all colors. In one case, which recovered vision, strabismus remained. In the others the vision continued greatly impaired. The ophthalmoscope showed the disks pale and indistinct, with vessels narrowed, especially the arteries.

[1] Klinische Monatsblätter f. Augenheilkunde, May–June, 1907.
[2] Trans. American Ophthalmological Society, xi, 2.
[3] Recueil d'Ophtalmologie, July, 1907.

Before the Berlin Ophthalmological Society, Czrellitzer[1] reported the case of a man engaged in grinding rubber. There were nausea, debility, diminished acuteness of vision, with central scotoma for red, and sluggish pupil reflexes. Under potassium iodide he recovered in twenty days. At the same meeting Levi reported the case of a young woman who had for one year and a half been working, three hours daily, with rubber in the carbon bisulphide solution. She had headache, vertigo, general muscular weakness, and bilateral ophthalmoplegia. She slowly recovered under the use of arsenic.

Amblyopia from Atoxyl. Since the use of this preparation of arsenic, in rather large doses, has been urged for the treatment of syphilis, it is well to know that, in addition to the colic and gastro-intestinal disturbances sometimes caused by it, atoxyl may cause a form of toxic amblyopia. Fehr[2] calls attention to this, reporting two cases of his own in which vision became reduced in both eyes without central scotoma, but especially in the nasal fields, and the optic disk was white, with contracted retinal arteries. On suspending the use of the drug, vision was regained. But in two cases previously reported by Bornemann and von Krüdener the amblyopia was permanent. Koch had reported 22 cases of blindness occurring in the sleeping sickness treated by atoxyl. But the dose he advocates for the treatment of that disease is now less than the one then employed.

Pituitary Disease Involving the Optic Tracts. The close relation of the optic tracts and chiasm to the pituitary body make disturbances of the field of vision among the most important symptoms of disease in that organ. If this fact be borne in mind, careful testing of the field of vision will throw light upon some very obscure general conditions, including somnolence and headache, disturbed nutrition, early menopause, change of disposition, etc.

Hansell[3] reports a case of tumor of the pituitary body. The patient had been drowsy for three months, and given to talking during sleep and dreaming, before impairment of vision led to the testing of his visual fields. For twenty-two days he had averaged twenty-two hours sleep each day. The visual disturbance included loss of color perception, concentric contraction of the fields, scotoma, irregular temporal hemianopsia. He went on to total blindness, temporary at first, but permanent for the last eighteen months of his life. During the last two years he had terrible attacks of temper. He never complained of headache or vomiting. The tumor was 4 cm. laterally by 1 cm. anteroposteriorly. Cases of hemianopsia with myxedema illustrate the close relation of pituitary and thyroid diseases. A case of the kind has been

[1] Klinische Monatsblätter f. Augenheilkunde, January, 1907.
[2] Deutsche med. Wochenscrift, December 5, 1907.
[3] Annals of Ophthalmology, January, 1907.

reported by Gourfein-Welt,[1] who collects similar cases from the literature, making four in all. These were largely relieved by thyroid feeding, which also caused improvement in the fields of vision.

Optic Atrophy with Cranial Deformity. This was referred to three years ago.[2] Videky[3] reports seven cases. Four of the patients were blind from birth, and the others became so during the first three years of life. The eyeballs were markedly prominent, although none of them was myopic. The ophthalmoscope showed postneuritic atrophy, but there was no other indication of meningitis, and the other cranial nerves were normal. In all the blindness affected both eyes. Krauss[4] reports on a patient seen at the age of twenty, in whom the skull, instead of being dome-shaped, or "tower-skull," had nearly the usual rachitic deformity. Radiographs showed an apparent dislocation of the sphenoid bone forward, affecting especially the small wings and the frontal part of the great wings. These encroached upon the orbit, and the optic atrophy was probably due to pressure in a narrow optic canal. The eyes had been prominent and the vision poor from birth. He was unable to learn to read or write, and the vision gradually grew worse.

LIDS, LACRYMAL APPARATUS, AND ORBIT.

Malignant Pustule of the Lids. Two cases of this disease starting in the upper lid, and ending in recovery, but with deformity of the lids, are reported by Morax.[5] In one of them, treated by anti-anthrax serum, the scarring was comparatively slight. In the other case, treated by injections of iodine, there was extensive sloughing and great cicatricial deformity, requiring plastic operations.

Antonelli[6] says that in the clinical service at Naples many cases are seen with characteristic deformities produced by this disease. The lid margins are commonly bound down to the border of the orbit, leaving the eyeball unprotected, in spite of any effort to close the lid, the cicatricial ectropion requiring the use of extensive skin flaps. Morax has investigated the prognosis of anthrax affecting the lids, and finds that of fifty cases which he tabulates, 30 per cent. were fatal. However, of the 10 cases in which the anthrax bacillus was found by bacteriological examination, 5 died—the same proportion as from anthrax of the skin of other parts of the body.

Gangrene of Lids. A case of this rare and imperfectly understood condition was reported by Harlan.[7] It occurred in a boy aged four. It

[1] Archives d'Ophtalmologie, September, 1907.
[2] Progressive Medicine, June, 1905, p. 331
[3] Zeitschrift f. Augenheilkunde, July, 1907, p. 94.   [4] Ibid., 1907, 5, 6, and 7.
[5] Annales d'Oculistique, November, 1907.
[6] Recueil d'Ophtalmologie, October, 1907, p 587
[7] Ophthalmic Record, March, 1907, p. 148.

began with sudden swelling of the right lids, which extended over the whole side of the head and to the lids of the left eye. When first seen, on the fourth day, there was an abrasion of the right upper lid. The discharge oozing from between the lids contained great numbers of pneumococci, but no other bacteria could be found. Free incisions, extending to the bone, gave vent to serum, but no blood escaped. The skin sloughed. The child had been previously healthy, well nourished, and had not been in contact with animals or their secretions.

Two cases of acute inflammation of the lid, in which sloughing occurred, demanding plastic operations, are reported by Possek.[1] The patients were both adults. In one the staphylococcus aureus was found in pure culture. No bacteriological examination of the other was made, but the patient had suffered two months before from influenza, with slight inflammation of Tenon's capsule.

Enlargement of the Lacrymal Glands, Mikulicz's Disease, and Tuberculosis. The clinical condition described by Mikulicz in 1892 has been so written about, and the name Mikulicz's disease applied to so many cases atypical in different ways, that there is serious confusion in the literature of the subject. Recently, however, typical cases reported by Dunn,[2] Napp,[3] and Krailsheimer[4] tend to clear our conceptions regarding this clinical entity, and indicate its close connection with tuberculosis.

The clinical characteristics, according to Mikulicz, are: its chronic benign course, symmetrical, bilateral enlargement of lacrymal and salivary glands, absence of inflammation, and little disturbance of general health. Histological studies show that the enlargement of the glands is due to increase of interstitial tissue, and its transformation into a lymphadenoid tissue. The proper glandular elements early disappear. The course of the disease may extend over months, years, or even decades.

Dunn's patient was a negro girl, aged thirteen years, who had suffered from mumps (lasting a few days) in June, and began to have swelling of the upper eyelids and in front of the ears in October. When first seen, in December, these swellings, due to enlargement of the lacrymal and parotid glands, were very marked. The enlarged lacrymal glands extended over the eyeball, two-thirds of the way to the inner canthus. The conjunctiva and mucous membrane of the mouth were abnormaly dry. There were no signs of inflammation. After this the swellings increased, the patient became weak and lost weight, and remained in bed with fever for several months. But within three years she began to get better. The swelling diminished, she became free from fever,

---

[1] Klinische Monatsblätter f. Augenheilkunde, February, 1907.
[2] Archives of Ophthalmology, January, 1907.
[3] Zeitschrift f. Augenheilkunde, June, 1907.
[4] Ophthalmoscope, March, 1908

and her general condition was good. There was no positive evidence of tuberculosis, but tuberculin tests seem not to have been tried. Treatment with mercury, potassium iodide, and arsenic were tried, but caused no improvement.

Napp's patient, a married woman, aged twenty-seven years, developed bilateral swelling of the parotid, submaxillary, and (eight days later) of the lacrymal glands. When seen, three months after this, the ocular conjunctiva showed miliary tubercles, and there were small excrescences on the palpebral conjunctiva. There were slight evidences of pulmonary involvement, but no evidence of syphilis. Microscopic studies of the palpebral conjunctiva showed miliary tubercles with caseous degeneration, and a few tubercle bacilli.

Krailsheimer's patient was a young man, aged nineteen years, who complained of dryness of the throat and eyes. There was enlargement of the lacrymal and the salivary glands. His health had been good, except an attack of pulmonary catarrh three years before. He had been treated for the enlarged glands with arsenic and x-ray exposures without benefit. Many of the lymphatic glands of the head, neck, and upper extremities were enlarged. He came under observation for inflammation of the eyes, bilateral iridocyclitis, which proved to be tuberculous. The submaxillary glands were removed, and were found to contain numerous tubercle bacilli with giant cells. Krailsheimer remarks: "Future investigations will need to settle the question whether this case may serve to illustrate that tubercle bacilli may be the cause of the disease, or that a patient affected with lymphadenoid glands becomes predisposed thereby to tuberculous infection."

Dangers of Injections into the Lacrymal Sac. Washing out the diseased lacrymal passages, by use of the lacrymal syringe, has been counted the most conservative treatment for dacryocystitis, but that it is not free from danger has been illustrated from time to time; and the newer silver salts, because they are non-irritant and used more freely, are thus especially liable to do harm. Park Lewis[1] reports a case in which an injection of 25 per cent. solution of protargol into a diseased lacrymal sac, by infiltration of the tissues, apparently intensified an orbital cellulitis already existing; and by extension of inflammation or pressure on the optic nerve caused complete permanent blindness and optic atrophy. Moulton[2] reports an accident less serious in its effects, but alarming and unpleasant enough, and one which has happened to several others. He injected a few drops of a 25 per cent. solution of argyrol into the canaliculus, and immediately there appeared over the lacrymal sac a dark stain, which in a few moments spread to the cheek and brow. There was some swelling and pain, which passed off in twenty-four hours. Immediate attempts to remove the solution, or decolorize it,

[1] Ophthalmic Record, December, 1907.
[2] Ibid., April, 1907.

were not successful. The discoloration was intense for several weeks; then for a few months it gradually faded, and subsequently remained stationary. After more than two years the staining was still noticeable to a distance of six or eight feet.

Emphysema of Orbit and Lids from Nasal Operation. A case reported by Stevens[1] illustrates a risk of ocular trouble following operation on the nose, less serious than that referred to in connection with the optic nerve and yet sufficiently unpleasant and alarming. The middle right turbinal had been removed with scissors and snare. During operation severe pain was felt in the right eye, and when the operation was finished the lower lid was swollen. When seen sixteen hours later both lids were swollen, the swelling and gaseous crepitation extending over the right temple to the ear. There was exophthalmos. The eye was turned outward, the ocular movements abolished, and diplopia present in all directions, except in the right periphery of the field. Pain was moderate, pupils normal. Under a pressure bandage and avoiding blowing of the nose or straining, the condition improved rapidly, and all symptoms had disappeared in about two weeks.

[1] Denver Medical Times, November, 1907.

INDEX.

PROGRESSIVE
MEDICINE

A QUARTERLY DIGEST

OF

ADVANCES, DISCOVERIES AND IMPROVEMENTS
IN THE MEDICAL AND SURGICAL SCIENCES

EDITED BY

HOBART AMORY HARE, M.D.

Professor of Therapeutics and Materia Medica in the Jefferson Medical College, Philadelphia

ASSISTED BY

H. R. M. LANDIS, M.D.

Assistant Physician to the Out-Patient Medical Department of the Jefferson Medical
College Hospital

JUNE 1, 1908

LEA & FEBIGER

PHILADELPHIA AND NEW YORK

SIX DOLLARS PER ANNUM

HARE'S PRACTICE

A TEXT-BOOK OF THE PRACTICE OF MEDICINE. For Students and Practitioners. By HOBART AMORY HARE, M.D., B.Sc., Professor of Therapeutics and Materia Medica in the Jefferson Medical College of Philadelphia. New (2d) edition, thoroughly revised. Octavo, 1132 pages, with 131 engravings and 11 full-page plates in colors and monochrome. Cloth, $5.00, *net;* leather, $6.00, *net;* half-morocco, $6.50, *net.*

The phenomenal demand for *Hare's Practice* has carried it through two very large printings and to a second edition in less than two years. This appreciation has been won by the author's recognized ability to determine what is really important and useful and to state it clearly. A well-balanced presentation of the whole of modern Practice in a single connveniet volume is the result. It deals adequately with pathology, symptoms and diagnosis, and provides ample space for full and precise therapeutical directions, proving the author's wide clinical experience, mature judgment and sound conservatism. This new edition has been thoroughly revised to date.

HARE'S PRACTICAL DIAGNOSIS

A TEXT-BOOK OF PRACTICAL DIAGNOSIS. The Use of Symptoms in the Diagnosis of Disease. By HOBART AMORY HARE, M.D., Professor of Therapeutics in the Jefferson Medical College of Philadelphia. New (6th) edition, thoroughly revised and rewritten. Octavo, 630 pages, with 263 engravings and 25 full-page colored plates. Cloth, $4.50, *net.*

A work suited equally to the needs of students and practitioners. Dr. Hare approaches the subject in the natural and direct way as the physician necessarily approaches his cases, namely, by ascertaining the symptoms and upbuilding the diagnosis therefrom. The discovery of any marked symptom leads the reader directly to the discussion of its diagnostic significance and the differentiation of the various affections in which it may occur. Dr. Hare has again improved the opportunity offered by the popularity of his book by subjecting it to a thorough revision and rewriting, so that it represents the latest developments. Abundantly illustrated with useful engravings and plates.

PARK'S SURGERY

THE PRINCIPLES AND PRACTICE OF MODERN SURGERY. By ROSWELL PARK, M.D., Professor of Surgery in the University of Buffalo, Buffalo, N. Y. In one imperial octavo volume of 1072 pages, with 722 engravings and 59 full-page plates in colors and monochrome. Cloth, $7.00, *net;* leather, $8.00, *net.*

This new work from the individual pen of Professor Park possesses a wide range of interest and importance. Comprising within a single volume the whole subject of surgery, both its principles and practice, and presenting it with the clearness of a gifted teacher as well as with the authority of one of the world's foremost surgeons, it provides an unsurpassed text-book for the student and a complete and resourceful guide for the practitioner. Surgeons will find it a valuable addition to their libraries. Copiously illustrated.

Jewett's Practice of Obstetrics

THE PRACTICE OF OBSTETRICS. By American Authors. Edited by CHARLES JEWETT, M.D., Professor of Obstetrics in the Long Island College Hospital, Brooklyn, N. Y. In one handsome octavo volume of 820 pages, with 484 engravings in black and colors and 36 full-page colored plates. Cloth, $5.00, *net;* leather, $6.00, *net.*

Composite works, if properly planned and edited, possess the homogeneity and completeness of the product of a single mind, and the added advantage of a higher and more uniform level of authority. Exhibiting these qualities and answering the needs of practitioners, teachers and students, the *Obstetrics* edited by Professor Jewett has merited the demand for successive editions. In this new one, fresh from the press, authors and editor have again brought every page abreast of the latest date, both in its clear text and its abundant and instructive illustrations.

New and Forthcoming

Osler's Modern Medicine